AUG 6 1934

There Is Wisdom in a National Policy That Seeks to Promote Prosperity and Establish Stability of the Activities on Which the Government Depends for Its Support and It Has a Vital Interest in the Availability of Industrial and Professional Information Which Acquaints the Representative Organizations with Its Aims and Purposes.

Vol. XXIII, No. 7 JULY, 1934

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

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THE 83rd ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN PORTLAND, ORE., IN 1935.

The 1935 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conference of Pharmaceutical Association Secretaries, of the Pharmaceutical Law Enforcement Officials and the Plant Science Seminar will also be held in Portland.

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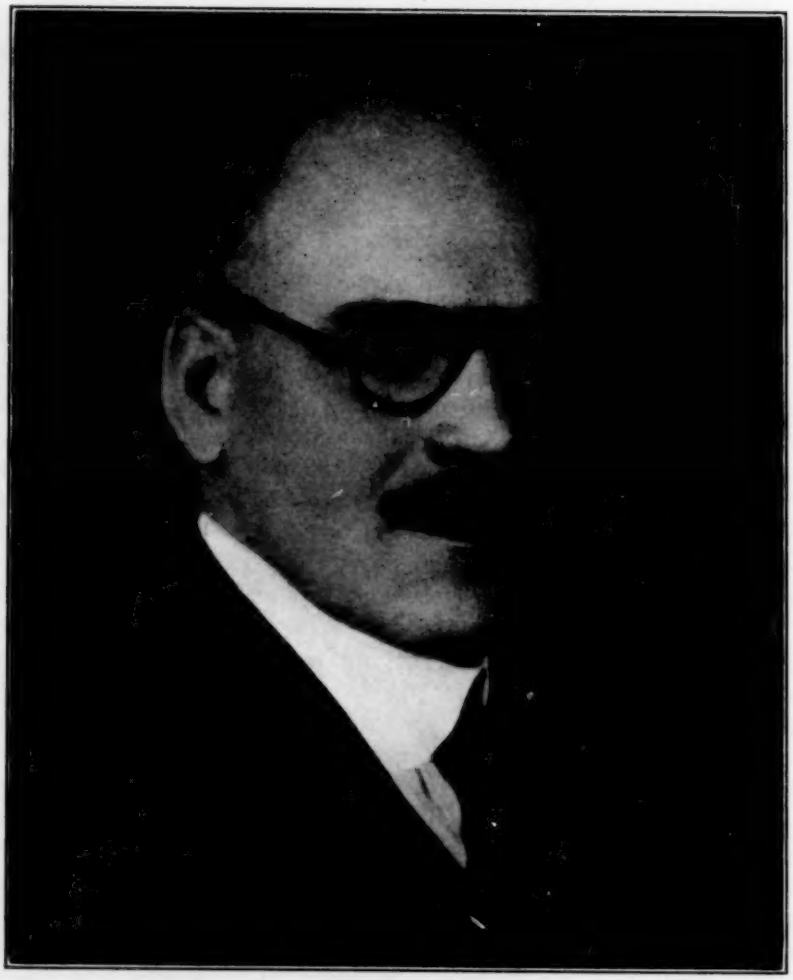
The Constitution of the AMERICAN PHARMACEUTICAL ASSOCIATION provides that such funds as may be bequeathed or otherwise donated to it shall be invested in U. S. Government, State, Municipal, County or other securities acceptable as security for postal savings deposits. In view of the scientific and educational nature of its work and since it is not operated for profit, donations to the ASSOCIATION may be deducted in computing income tax under the fifteen per cent proviso. Full information relating to this matter will be furnished if desired.

The American Institute of Pharmacy is a permanent service institution and also provides a splendid opportunity to memorialize those who have contributed their knowledge and endeavor to the preservation of public health and to the further advancement of science in pharmacy. It is the hope of the ASSOCIATION that the work so auspiciously begun may advance by the generous support of all its members.



ERNEST LITTLE.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXIII JULY, 1934 No. 7

THE PRESIDENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY, 1934–1935.

Ernest Little was born in Johnstown, N. Y., June 9, 1888, the son of John and Martha Snook Little. He received his earlier education in the elementary schools of his home city and Johnstown high school, from which he graduated in 1907. He pursued undergraduate work at the University of Rochester until 1911, when he was awarded the B.S. degree in Chemistry. Here he continued graduate work, receiving the M.S. degree in 1913. His graduate work at the University was carried on under the direction of Dr. Victor J. Chambers, and largely in the field of nutrition, food and organic analysis; the thesis submitted was on "The Alkaline Copper Solution as Used in Sugar Analysis." It recorded a critical study of the various oxidation and reduction methods, both gravimetric and volumetric. He then enrolled as a graduate student at Columbia University and was awarded the A.M. degree in 1918. The work followed the lines of his prior studies, including also physical and colloidal chemistry. Continued graduate work at Columbia earned for him the Ph.D. degree, in February 1924. Research work for this degree was carried on in the department of analytical chemistry and was published in a treatise entitled "The Determination of the Acidity of a Tan Liquor," in which gross inaccuracies were shown in the methods heretofore employed and a simple accurate method involving the use of the cadmium half-cell was recommended.

Dr. Little has been a frequent contributor to various chemical publications and in recent years to pharmaceutical journals. He is a member of Kappa Psi, Phi Beta Kappa, Sigma Psi and Phi Lamba Upsilon. He is president of the Northern New Jersey Branch, A. PH. A.; member of the Revision Committee U. S. P. XI, chairman of the committee on Test Solutions and Reagents, Inorganic Chemicals, Tables, Weights and Measures. He is member of the Committee on Membership Standards, A. A. C. P. and of the Standing Committee on Chemistry of the boards and colleges, District No. 2. He is president of the Board of Education of Highland Park, N. J., and member of the Board of Directors of Newark Rotary Club.

In 1910, Dr. Little was assistant in Physics and Mathematics at Mechanics In-

stitute, Rochester; from 1911–1914, he was member of the faculty of Rochester University; 1914–1918 he was instructor in Leather Chemistry at Pratt Institute, Brooklyn, and from 1918–1928 member of the faculty of Rutgers University: professor of Physics and Chemistry, New Jersey College of Pharmacy (Rutgers University College of Pharmacy) and since 1926, dean and professor of Chemistry.

"PROFESSIONAL" IN THE RETAIL CODES.

The following is taken from *The Blue Eagle* of June 25th:

"A 'professional' in the retail trade has been defined by the National Recovery Administration.

"Under the definition given only the following can be properly classified as professionals: Chemists, physicists, dentists, physicians and surgeons, registered nurses, chiropodists, pharmacists, optometrists, architects, artists and creative decorators, training directors whose entire time is devoted to education or training, research technicians, statisticians, engineers (who hold degrees from qualified institutions of higher learning).

"The interpretation defines as a professional 'a person whose work is: (1) Predominantly intellectual or mental in character as opposed to purely physical work or work involving the application of manual, mechanical, physical or operative technique or skills, and (2) based upon educational training in a specially organized body of knowledge as distinguished from training of a manual, mechanical or operatively technical type, or the performance of routine mental processes in accordance with a previously indicated or standardized formula, plan or procedure, and (3) of a nature that is creative and cannot be carried on by anyone not having a similar training or qualifications without losing its unique characteristics.'"

View of Dedication Ceremonies of American Institute of Pharmacy.

EDITORIAL

E. G. EBERLE, EDITOR 2215 Constitution Ave., WASHINGTON, D. C.

HEROES IN HEALTH SERVICE.

HISTORY abounds in records of valor stimulated by patriotism in defense of country and the world. The acts longest and most generally remembered are those wherein lives are sacrificed in their country's cause; memorials are erected so that their names and deeds may be reminders of duties and service honorably rendered.

Paintings, statues and printed pages remind us of outstanding deeds in military service and dedications to the unknown, honoring those who in large numbers had an essential part in the success of a just cause.

The memory of those who have achieved great things in public health matters lives in the results of their researches, whereby sections of the world have been made habitable, destructive diseases have been conquered, and painful and burdensome afflictions have been made more bearable. Among these benefactors are scientists who suffered greatly so that others may be happier and more comfortable, individuals characterized by heroic unselfishness, thinking modestly of themselves, but intensely desirous of aiding the afflicted; their viewpoint regarding them reaches millions represented in types they know and with whom they sympathize, because of their affliction.

In the class referred to are many; their services differ, but all of them have made signal contributions to health, prosperity, discovery, education, commerce, industry, arts and professions, all closely linked in the benefactions derived from devotion, labor, study, investigation and, above all, the loftiness of purpose which prompts their efforts. Reference may be permitted to discoveries which have converted to livable areas in which life was constantly endangered by disease and thereby development made impossible; laboratories conducting research are not free from dangers and its workers receive coöperation from laymen who desire a part in discoveries that may result in disease immunity, citing as a recent example the volunteers to submit themselves as tests for the efficacy of anti-paralysis serum. There may also be included the hardships of carriers of food and medicines to afflicted sections. Yellow fever was conquered because of the heroism of Gorgas, Lazear, Finlay, Agramonte, Reed and others; the achievements in Cuba and the Canal Zone were heroic and of inestimable value not merely through the immediate benefits and benefactions, but by proving that disease can be controlled and plagues checked, of which there is continued evidence.

This editorial comment was prompted by the passing of a heroine, the discoverer of radium, Madam Marie Curie, who endured the hardships of poverty in early life and had the courage to carry on, resulting in her great achievements; she could appreciate that fortune was with her when she found employment at Sorbonne cleaning the furnace and washing bottles in the laboratory, and modestly accepted recognition of the great honors which came to her not very many years later. With her passed out a heroine and one of the prominent figures in science and an outstanding benefactress of humanity. One of the great days in her life was May 20, 1921,

when she received the gift of radium through President Harding, not for herself, but because she realized its great value for the afflicted, whom she relieved and served. The effect of radium made itself known in her health and exacted its toll. During the few days prior to her death Mme. Curie gave directions concerning experiments being conducted in her Paris laboratory, and, later, she gave directions for her funeral.

"Heroism is active genius; genius, contemplative heroism. Heroism is the self-devotion of genius manifesting itself in action."

THE SERVICE OF PHARMACY.

THERE is a growing development of the service of pharmacy and a greater realization of the need of closer coöperation of those engaged in the medical professions. Discussions of the subject occupied much of the time at the recent AMERICAN PHARMACEUTICAL ASSOCIATION meeting in Washington, and at state medical meetings there was an evident desire to gain a better understanding of how to prescribe and how coöperation of the physician, dentist and pharmacist may serve the patient better. This desire is in evidence everywhere; to impress that, parts from two addresses are quoted—one delivered before the pharmacists in Edinburgh, Scotland, and the other in far-off Bengal.

Dr. J. M. Johnston, pharmacologist to the Scottish Department of Health and a member of the Poisons Board set up under the Pharmacy and Poisons Act, 1933 (Great Britain), said in closing an address to the Edinburgh pharmacists that "the pharmacist has a part to play in the question of the use and misuse of drugs. There is ample scope for the education of the public, and also, as opportunity arises, for the education of the medical profession. I hope the pharmacists will rise to the occasion, and, steering clear of the dangers of commercialism, will raise the profession of pharmacy to its proper place in the battle against disease. Much of the analytical work at present undertaken by pharmacologists could more properly be left to the pharmaceutical chemist, for whom there is also awaiting the promising field of biochemical investigations which are so necessary for modern clinical medicine. The keynote for the future of the pharmacist would appear to be a combined policy of education and investigation."

Lieut.-Col. Chopra opened his presidential address to the All-Bengal Compounders' Association by saying that "as a pharmacologist who has to work with drugs I am very interested in the profession of pharmacy which you practice. The important part which pharmacists play in relation to drugs needs no special emphasis. You, as their representatives in this country (Bengal), are the custodians of drugs. You prepare and compound drugs and on your efficiency depend the purity and efficacy of the preparations dealt with by you. Your relation to the practice of medicine in every-day life is intimate and you are an integral part of it. The busy physician dealing with diagnosis and treatment of disease has no time at his disposal to dispense his own medicine as he used to do in the old days. Pharmacy has developed enormously along with medicine and the wider scope of the two sciences makes it impossible for the medical practitioner to devote himself systematically to the study of pharmacy. In matters of drugs, their preparation and

dispensing, therefore, the physician has to depend entirely on the advice and guidance of the pharmacist. The physician has sometimes to use very potent drugs which require to be handled with the most exact and scrupulous care. Skilful dispensing is essential for the successful treatment of disease by those practicing medicine."

"A Suggestion for the Establishment of a National Council on Pharmaceutical Practice," has as the first objective a study of the needs of each field of activity and then a preparation for announcing these needs to the country; it also is proposed to make a restatement of codes of ethics and practice, for each group as the basis for a high professional standard.

CODES.

THE great hindrance in undertakings to be overcome is selfishness and the desire to stand out in public appreciation. This, frequently, is also true in legislation, for while all statesmen are politicians, not all politicians are statesmen. The work of recovery depends upon honesty, initiative, understanding, self-reliance and resourcefulness to meet conditions as they arise.

The greater number of druggists have expressed themselves as favorable to a continuation of the National Retail Drug Code, and the *Literary Digest* survey shows that more than sixty per cent are in favor of the New Deal policy.

The first year of NRA was devoted chiefly to codifying industry, more than four hundred basic codes of fair competition have been put into operation, representing 96 per cent of trade and industry in the United States, the next year's work will largely be directed to the enforcement of the codes.

As seen from the press there is contemplated a reorganization of the Recovery Administration under a board, instead of a single administrative head. The question arises as to the kind of administrative agency is best adapted to carry on the activities of the NRA. When the change will be made seems to be undecided, however, the surveys indicate that the life of the Recovery Administration will be indefinitely prolonged. The size of the administrative body has not been determined, but there is quite general expression that the members should have well-defined duties and share in the responsibilities of the administration and the work of the administration should be placed on a broader basis.

Notwithstanding the different opinions as to the workings of the NRA we should seek and encourage "the greatest good for the greatest number;" and "the highest law is that created to relieve the imperative needs of the people."

PHARMACY EXHIBIT AT PROGRESS OF SCIENCE.

When you are in Chicago see the Pharmacy Exhibit. The AMERICAN PHARMACEUTICAL ASSOCIATION is, as last year, sponsoring the exhibit. A significant indication of the enthusiastic approval given last year's enterprise is the fact that the committee this year received almost 100 per cent favorable responses from participants to the questionnaire sent to the leading contributors to the 1933 exhibit. The pharmaceutical showing of last year proved to be one of the most popular of the exhibits in the medical division.

SCIENTIFIC SECTION

BOARD OF REVIEW OF PAPERS.—*Chairman*, F. E. Bibbins, George D. Beal, L. W. Rising, H. M. Burlage, L. W. Rowe, John C. Krantz, Jr., Heber W. Youngken.

THE ABSORPTION OF CALCIUM.*

(A PRELIMINARY REPORT.)

BY A. RICHARD BLISS, JR.,[1] ELLSWORTH O. PRATHER, JR.,[2] AND ROBERT W. MORRISON.[3]

INTRODUCTION.

The metabolism of calcium is intimately related to the calcium and phosphorus content of the ingested food, the activity of the parathyroids, vitamin D and possibly vitamins A and C. Normally, the blood serum contains from 9.0 to 11 mg. of calcium per 100 cc. (1); but in sickness and wasting diseases the amount is lower. In some forms of tetany (2) it has been found occasionally less than half the normal. Updegraff, Greenberg and Clark (3) found that approximately 50 per cent of the total serum calcium is *non-diffusible* or bound calcium, and the remainder is *diffusible;* but Kugelmass and Shohl (4) showed that only a portion of the diffusible calcium is ionized. Some are of the opinion that *ionic calcium* is the active portion, and that the serum calcium is consequently not a true index of the calcium balance. Since ionic calcium diminishes cell permeability (5), excessive amounts decrease cellular activity.

It has been estimated that 99 per cent of the calcium in the body is stored in the bones and teeth as phosphate and carbonate. These compounds provide a reserve to keep the blood calcium normal. Vitamin D is concerned in the development of the teeth, and Bauer and Marble (6) have demonstrated that this vitamin increases the absorption of calcium and phosphorus from the gastro-intestinal tract. In low calcium supply and in chronic states of debility, the bones slowly atrophy through being thus drawn upon for calcium. In acidosis the bone calcium is apparently not readily available. Although the average adult requires about 0.45 Gm. of calcium a day, Sherman (7), to insure the optimum concentration in the blood for both adults and children, advises a minimum of 1 Gm. Sherman and Booher (8) have shown that in growing children the bones may grow in size while calcium poor. During lactation and in the last months of pregnancy, the mother requires double the usual supply of calcium, and, if it is not furnished by the food, loses it from her own bones and teeth. Rickets is associated with inadequate calcification of the bones, and is dependent on derangement of calcium and phosphorus metabolism. It is well known that premature infants are especially predisposed to rickets, since they have less than the normal supply of calcium and phosphorus at birth.

Absorption of calcium takes place in the intestines, but it is influenced by a number of factors. Absorption is *diminished* by: (A) an *excess of phosphorus* in

---

* Scientific Section, A. PH. A., Madison meeting, 1934.

[1] Director of the Reelfoot Lake Biological Station, Reelfoot Lake, Tennessee.

[2] Instructor in Pharmacology, University of Tennessee.

[3] Associate Professor of Pharmacology, University of South Carolina.

the food, resulting in the formation of the unabsorbable tribasic calcium phosphate; (B) an *excess of fat* in the diet or the incomplete utilization of fat, resulting in the formation of insoluble calcium soaps; (C) *intestinal alkalinity*, as from the ingestion of alkalies, or after meals when there is an abundance of the alkaline pancreatic and intestinal juices and bile (Zucker and Matzner (9) by adding sodium bicarbonate to the diet produced rickets in rats); (D) *hurried loose stools*, as in diarrheas; (E) *stools bulky with cellulose* and roughage. The greater the bulk of the feces, following the ingestion of bran, carrots, spinach, agar, and cellulose flour for bulk, the greater is the loss of calcium.

The absorption of calcium is *favored* by: (A) *intestinal acidity*, as that which may follow the administration of diluted acids, acidified milks and acidotic diets (Aub, *et al.* (10) claim that an acidotic diet may double the urinary calcium, an indication of increased absorption; but if a neutralizing amount of sodium bicarbonate is given with this diet, the urinary calcium is not increased); (B) *the addition of lactose to the food*, which according to Roe and Kahn (11) is probably due to the formation of lactic acid in the intestines.

Calcium chloride and calcium lactate have been extensively studied to determine their absorbability when given orally. Clark (12) with rabbits, Kramer and Howland (13) with rats, and Denis and Minot (14) and a number of others with humans, obtained no significant rise in the blood calcium. However, some observers have reported their absorption. From single doses of 5 Gm. in each of nine human subjects, Aub, Bauer, Heath and Roper (15) reported a rise of 5 to 14 per cent, and from 10 Gm. in eight subjects, a rise of 5 to 28.5 per cent. The maximum rise was found between the first and the fifth hours, and in thirteen of the seventeen subjects, the calcium did not return to the pre-ingestion level for twelve hours. With 5 Gm. doses of the lactate dissolved in water and given on an empty stomach, Roe and Kahn (11) obtained in ten men an average maximum rise in blood calcium of 80 per cent at six to seven hours, the calcium remaining above normal for nine hours; while with 2 Gm. doses they obtained an average maximal rise of 41 per cent at six hours, the calcium remaining above the pre-ingestion level for one and one-half hours longer. Mason (16), Myers and Fine (17), and others reported the lactate inefficiently and the chloride readily absorbed.

According to Meltzer (18), the most effective way to deprive the body of calcium is to give magnesium. Mendel and Benedict (19) and others have demonstrated that magnesium forces calcium from the system. It appears that an excess of magnesium ion exercises a marked specific inhibitory effect on calcification (20, 21, 22, 23). Kramer, *et al.* (24) found that, following the administration of magnesium chloride or sulphate, the inhibition of calcification began when the magnesium of the blood rose above normal. They reported also that as the inorganic phosphorus increased more magnesium was required for the inhibition. It appears that there may be some hazard in the repeated administration of milk of magnesia, at least to children or to those with fractured bones. A diet deficient in calcium is the more harmful if it is at the same time rich in magnesium. Since the magnesium of the cereal grains is mostly in the bran, some pediatricians advise against bran and whole wheat for children. In milk and many vegetables the calcium is high and the magnesium low.

THE METHOD.

The method is based on the antagonism between magnesium and calcium, which, in earlier experiments was observed in animals narcotized by magnesium and awakened by injections of calcium chloride. In these experiments white mice were used. The calcium salts were given by mouth, and, after a certain length of time, the magnesium sulphate ($MgSO_4.7H_2O$) was injected subcutaneously. At the same time controls were run. If some of the ingested calcium were absorbed, then a greater amount of magnesium sulphate is necessary to produce narcosis than is the case where no calcium is given or absorbed.

For from twelve to fifteen hours before the calcium salts were administered the mice received no food or water. The calcium salts were given in 3% to 10% aqueous solutions or suspensions injected into the stomach by means of a thin stomach tube fitted with a small syringe. The time interval between the feeding of the calcium and the injection of the magnesium was two hours. Magnesium sulphate was injected subcutaneously in a 10% aqueous solution. A definite degree of narcosis was required which the authors determined to be at the point where the mice lie on their backs without movement or attempts to turn over. This degree of narcosis is usually reached by effective doses in from twelve to twenty minutes after the injection.

On the basis of an extensive series of preliminary experiments (Table I), 0.9 mg. of magnesium sulphate per Gm. of body weight proved to be just sufficient to produce the desired state of narcosis in the mice. The amount of each calcium salt administered in mg. per Gm. of body weight is equivalent to 0.3 mg. of calcium per Gm. of body weight.

TABLE I.—MAGNESIUM SULPHATE ($MgSO_4.7H_2O$).

Wt. (Gm.) of Mouse.	Dose of $MgSO_4$ Mg. per Gm.	Effect.	Time to Action.
18.27	0.75	None	.....
18.04	0.75	None	.....
23.81	0.75	None	.....
20.32	0.75	None	.....
14.75	0.80	Partial narcosis	18 min.
21.30	0.80	"	17 min.
18.70	0.80	"	20 min.
15.25	0.80	"	30 min.
18.70	0.90	"	20 min.
16.45	0.90	"	20 min.
14.62	0.90	"	20 min.
18.24	0.90	"	20 min.
14.70	0.95	"	18 min.
26.56	0.95	Complete narcosis	16 min.
17.20	0.95	"	17 min.
18.00	0.95	"	16 min.
14.00	1.00	Complete narcosis	20 min.
15.70	1.00	"	18 min.
25.65	1.00	"	17 min.
18.58	1.00	"	17 min.
18.63	1.50	"	14 min.
20.46	1.50	"	12 min.
17.00	1.50	"	7 min.
18.40	1.50	"	10 min.

TABLE II.—CALCIUM CHLORIDE.

Wt. (Gm.) of Mouse.	Mg. of $CaCl_2$, per Gm. Body Wt.	Dose (Mg. per Gm.) of $MgSO_4$ 2 Hrs. after Ca.	Time to Narcosis.
20.85	0.82425	1.0	.....
21.75	"	1.0	.....
21.84	"	1.0	.....
16.77	"	1.25	Partial; 20 min.
23.55	"	1.25	Partial; 31 min.
28.50	"	1.25	Partial; 26 min.
23.75	"	1.50	Complete; 18 min.
19.52	"	1.50	Complete; 15 min.
18.60	"	1.50	Complete; 13 min.

TABLE III.—CALCIUM LACTATE.

Wt. (Gm.) of Mouse.	Mg. of Lact., per Gm. Body Wt.	Dose (Mg. per Gm.) of $MgSO_4$ 2 Hrs. after Ca.	Time to Narcosis.
24.37	1.63635	0.90	.....
19.61	"	0.90	.....
22.98	"	0.90	.....
24.76	"	1.00	.....
21.86	"	1.00	.....
22.86	"	1.00	Partial
23.70	"	1.25	"
22.40	"	1.25	"
17.38	"	1.25	"
18.77	"	1.50	Partial
20.41	"	1.50	Complete; 20 min.
22.43	"	1.50	Complete; 17 min.
21.57	"	2.00	Complete; 10 min.
17.82	"	2.00	Complete; 11 min.
22.50	"	2.00	Complete; 15 min.

TABLE IV.—CALCIUM GLUCONATE.

Wt. (Gm.) of Mouse.	Mg. of Glucon., per Gm. Body Wt.	Dose (Mg. per Gm.) of $MgSO_4$ 2 Hrs. after Ca.	Time to Narcosis.
18.91	3.364215	0.90	.....
21.43	"	0.90	.....
17.19	"	0.90	.....
18.23	"	1.00	Partial; 20 min.
18.23	"	1.00	Partial; 30 min.
22.83	"	1.00	Partial; 24 min.
22.00	"	1.25	Partial; 20 min.
21.00	"	1.25	Partial; 22 min.
22.72	"	1.25	Partial; 20 min.
21.67	"	1.50	Partial; 20 min.
17.00	"	1.50	Complete; 20 min.
18.62	"	1.50	Complete; 20 min.
23.16	"	2.00	Complete; 14 min.
16.95	"	2.00	Complete; 11 min.
18.82	"	2.00	Complete; 12 min.

TABLE V.—CALCIUM DIPHOSPHATE.

Wt. (Gm.) of Mouse.	Mg. of Diphos. per Gm. Body Wt.	Dose (Mg. per Gm.) of $MgSO_4$ 2 Hrs. after Ca.	Time to Narcosis.
16.82	1.29375	0.9	.....
21.69	"	0.9	.....
17.52	"	0.9	.....
19.66	"	1.0	Partial
15.15	"	1.0	"
21.57	"	1.0	"
21.00	"	1.25	Partial; 20 min.
17.30	"	1.25	Complete; 13 min.
21.30	"	1.25	Complete; 12 min.
17.67	"	1.50	Complete; 12 min.
23.77	"	1.50	Complete; 10 min.
20.46	"	1.50	Complete; 5 min.

TABLE VI.—CALCIUM GLYCEROPHOSPHATE.

Wt. (Gm.) of Mouse.	Mg. of Glyceroph. per Gm. of Body Wt.	Dose (Mg. per Gm.) of $MgSO_4$ 2 Hrs. after Ca	Time to Narcosis.
20.34	1.6115	0.9	Partial
19.50	"	0.9	"
16.85	"	0.9	"
15.12	"	1.0	Complete; 20 min.
16.10	"	1.0	Partial
18.00	"	1.0	Complete; 8 min.
19.00	"	1.25	Complete; 20 min.
19.50	"	1.25	Complete; 9 min.
22.72	"	1.25	Complete; 8 min.
23.00	"	1.50	Complete; 7 min.
20.09	"	1.50	Complete; 11 min.
16.54	"	1.50	Complete; 12 min.

TABLE VII.—INOSITE HEXACALCIUM GLUCONATE.

Wt. (Gm.) of Mouse.	Mg. of Inosite Comp. per Gm. Body Wt.	Dose (Mg. per Gm.) of $MgSO_4$ 2 Hrs. after Ca.	Time to Narcosis.
16.82	1.20096	0.9	.....
21.82	"	0.9	.....
19.77	"	0.9	.....
17.62	"	1.0	.....
18.00	"	1.0	Partial; 20 min.
21.76	"	1.0	Partial; 20 min.
17.18	"	1.0	Partial; 20 min.
18.75	"	1.0	Partial; 20 min.
17.56	"	1.0	Partial; 20 min.
15.00	"	1.25	Partial; 20 min.
16.37	"	1.25	Partial; 20 min.
15.00	"	1.25	Complete; 20 min.
18.66	"	1.25	Partial; 20 min.
18.80	"	1.25	Partial; 20 min.
20.17	"	1.25	Complete; 15 min.
20.00	"	1.25	Complete; 13 min.
18.00	"	1.50	Complete; 10 min.
20.00	"	1.50	Complete; 20 min.
22.86	"	1.50	Complete; 20 min.

21.80	"	1.50	Complete; 19 min.
22.85	"	1.50	Complete; 13 min.
17.44	"	1.50	Complete; 11 min.

TABLE VIII.—SUMMARY.

Drug.	Amt. $MgSO_4$ Causing Partial Narcosis.	Amt. $MgSO_4$ Causing Complete Narcosis.
Calcium chloride	1.25* (3 out of 3)	1.50* (3 out of 3)
Calcium lactate	1.00 (1 out of 3)	
	1.25 (3 out of 3)	
	1.50 (1 out of 3)	1.50 (2 out of 3)
		2.00 (3 out of 3)
Calcium gluconate	1.00 (3 out of 3)	
	1.25 (3 out of 3)	
	1.50 (1 out of 3)	1.50 (2 out of 3)
		2.00 (3 out of 3)
Calcium diphosphate	1.00 (3 out of 3)	
	1.25 (1 out of 3)	1.25 (2 out of 3)
		1.50 (3 out of 3)
Calcium glycerophosphate	0.90 (2 out of 3)	
	1.00 (1 out of 3)	1.00 (2 out of 3)
		1.25 (3 out of 3)
		1.50 (3 out of 3)
Inosite hexacalcium gluconate	1.00 (5 out of 5)	
	1.25 (4 out of 7)	1.25 (3 out of 7)
		1.50 (6 out of 6)

* mg. $MgSO_4.7H_2O$ per Gm. of mouse.

DISCUSSION.

In Table I are shown the effects produced by various amounts of magnesium sulphate ($MgSO_4.7H_2O$). Nine-tenths of a milligram (0.9 mg.) per Gm. of body weight was shown to be the amount required to produce the desired state of narcosis in white mice.

Tables II through VIII show the effects produced by magnesium sulphate in various doses following the oral administration of equivalent quantities (Ca) of the six calcium compounds studied. By subtracting 0.9 mg. from the magnesium sulphate values given in these tables (II–VIII), the amounts of magnesium sulphate required to completely antagonize the *absorbed* calcium are obtained. The greater the quantity of magnesium sulphate required to produce the narcosis, the larger the amount of *absorbed* calcium.

When arranged according to relative efficacy the calcium compounds used in this study place themselves in the following order:

(1) Calcium lactate
(2) Calcium gluconate
(3) Calcium chloride
(4) Inosite hexacalcium gluconate
(5) Calcium diphosphate
(6) Calcium glycerophosphate.

When arranged quantitatively according to the actual amounts of the calcium compounds themselves administered and expressed in grams per Gm. of body weight of mouse, the order is:

(1)	Calcium chloride	0.00082425
(2)	Inosite hexacalcium gluconate	0.00120096
(3)	Calcium diphosphate	0.00129375
(4)	Calcium glycerophosphate	0.00161150
(5)	Calcium lactate	0.00163635
(6)	Calcium gluconate	0.00336241

The foregoing quantities represent equivalent amounts of calcium.

Attention is called to the fact that this preliminary study leaves relatively wide gaps between the various quantities of magnesium sulphate used to neutralize the absorbed calcium (gaps between 1.0 and 1.25, 1.25 and 1.50, 1.50 and 2.00); and also that but one time interval (2 hours) was involved. Consequently further studies are underway in which the effects of longer time intervals between the doses of the calcium compounds and the doses of the magnesium sulphate are being recorded, as well as the effects of increases of 0.1 mg. of magnesium sulphate per Gm. of body weight of mouse between the values (1.0 and 1.25, 1.25 and 1.50, 1.50 and 2.00) which appear in the present tables.

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THE SOLUBILITY OF CALCIUM LEVULINATE IN WATER.

BY GERALD J. COX,[1] MARY L. DODDS[2] AND CLARENCE CLASPER.[3]

Calcium levulinate has been shown to be more satisfactory for parenteral administration of calcium than any other known salt (1, 2). Anticipating the prob-

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able early adoption of this compound in therapeutics, we have determined the solubility of calcium levulinate in water over a range of temperature as an aid in the technology of both the preparation of solutions and the purification of the salt by crystallization.

The calcium levulinate samples for this study were purified by repeated crystallization from water and alcohol mixtures and dried in air at room temperature. The criteria of purity were the absence of color in concentrated solutions and the calcium content. The latter was determined by permanganate titration of the precipitated calcium oxalate from nine samples and found to average 13.33% calcium compared with the theoretical value of 13.09% from $Ca(C_5H_7O_3)_2.2H_2O$.

Saturated solutions of calcium levulinate in distilled water were prepared by immersion in appropriate baths at seven different temperatures of (1) water and excess calcium levulinate, and (2) solutions of calcium levulinate saturated at higher temperatures. After about six hours, samples were withdrawn isothermically and weighed. Calcium was determined on aliquots of the samples by permanganate titration of the precipitated oxalate. The temperature of saturation was determined by means of short stem immersion thermometers calibrated by the Bureau of Standards.

The means of at least four determinations at each temperature were used in the calculation of an equation which shows the composition of a saturated solution at temperatures from 0° to 55.4° C. This equation is

$$p = 27.58 + 0.173t + 0.0031t^2$$

in which "p" is the number of grams of calcium levulinate, $Ca(C_5H_7O_3)_2.2H_2O$ per hundred grams of solution and "t" is temperature in centigrade degrees.

Comparison of the observed solubilities with those calculated from the equation are shown in Table I.

TABLE I.

Temp., °C.	Mean p., Observed.	p., Calc'd.
0	27.6	27.58
15.8	31.1	31.08
25.0	34.0	33.81
30.0	35.5	35.56
37.0	38.7	38.32
45.3	41.4	41.48
55.4	47.0	46.67

For "p" = 100, "t" is found to be 127.4° C. The temperature, 127.4° C. therefore is the calculated point at which calcium levulinate dissolves in its water of crystallization. Melting points for the material used were found to range from 108° to 125° C. depending on the rate of heating. The latter melting point was obtained by immersion of open capillary melting point tubes in a bath at 125° C. The time rate of melting was approximated to those of benzoic acid in a bath at 122° C. and of urea at 132° C. As the observed melting point is in fair agreement with the calculated, the equation can be applied safely for temperatures above 55.4° C., the maximum used in this study.

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CONTRIBUTION FROM THE SUGAR FELLOWSHIP,
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PHYTOCHEMICAL NOTES.*[1]

No. 110. DIGITONIN AND PHYTOSTEROL FROM THE SEED OF DIGITALIS PURPUREA.

BY OLE GISVOLD.

A kilo of seed, not comminuted, was extracted with a liter of alcohol in a continuous extraction apparatus for 8 hours and the extract tested for digitonin with cholesterol. The extraction was repeated with a like amount of solvent for 10 hours and a third time for 12 hours. The third extract gave but a slight precipitate with cholesterol.

The same process was repeated with comminuted seed. So far as the digitonin was concerned, the results appeared to be about the same. However, the comminuted seed gave up more of its fatty oil. These results might have been anticipated, since the digitonin is located in the seed coating, whereas the fatty oil is located in the cotyledons.

The balance of the available seed, 25 pounds, all of which had been raised in the Garden of the Pharmaceutical Experiment Station under the direction of Prof. W. O. Richtmann, was ground and extracted in the Lloyd extractor.

The first alcoholic concentrates removed had separated a considerable amount of fat with which was mixed a solid substance that was removed by force filter. Hence the alcoholic concentrate yielded two products, *viz.*:

1. The solid that remained in the filter and which was shown to be a digitonide, and digitonin.

2. The filtrate which consisted of the alcoholic extract plus dissolved and separated fat.

1. Purification and identification of the digitonide. The greenish material which had remained in the filter was several times suspended in hot petroleum ether to remove fat which was added to the other petroleum-ether extracts. After that it was suspended several times in hot alcohol to remove any alcohol-soluble material. The substance thus purified was designated "A;" the combined alcoholic filtrates were designated "B."

(A) The purified and pulverized solid weighed 18.5 Gm. It was suspected to be digitonide, since the digitonin from the seed coats and the sterol from the cotyledons would naturally be brought together in the alcoholic extract. In so far as the two dissolved substances met within the tissue of the seed, the insoluble digitonide resulting should be found in the extracted marc. In so far as the two substances reacted in the percolate, they would precipitate each other.

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* From the laboratory of Edward Kremers.

[1] Scientific Section, A. PH. A., Madison meeting, 1933.

In order to test this hypothesis, the substance was treated with boiling xylene in the usual manner (1). The extract precipitated digitonin (2) and gave good positive color reactions with both the Liebermann-Burchard (3), and the Salkowski (4) tests. Hence it was pronounced a sterol. It melted at 137° to 138° (5) and yielded an acetate which melted at 130° to 131°. No change in the melting point of the alcohol could be observed when mixed with the sterol obtained from stramonium seed. According to Windaus' test, it contained no stigmasterol (6). Culter reports that the sterol isolated by him (7) melted between 93° and 105°, which very fact proclaimed it as impure. Examination revealed his impure sterol to contain hydrocarbons, too minute in quantity to be identified. When purified by the removal of this hydrocarbon it had the same melting point as that found by the writer.

The residue in the extraction capsule was digitonin. It had the capacity to precipitate sterols, also gave the Keller color reaction (10).

(B) The alcoholic filtrate "B" upon cooling and standing yielded a light greenish precipitate. Its solution in 85 per cent alcohol, after boiling with animal charcoal, yielded a colorless filtrate which upon cooling deposited a white crystalline material. Inasmuch as it had the capacity to precipitate cholesterol, it was assumed to be digitonin. It likewise gave a positive Keller color reaction (11).

. . .

The original alcoholic concentrate, from which the substances described above had been removed by filtration, was defatted in a manner described and illustrated in another paper (8).

I. The petroleum-ether residue, consisting, no doubt, for the most part of fatty oil, was set aside. Culter not long ago reported on the constituents of the fatty oil of digitalis seeds (7). If deemed desirable, the fat may be reëxamined later.

II. To the defatted alcoholic concentrate, heated almost to the boiling point, successive portions of cholesterol (9) dissolved in 95 per cent alcohol were added until no further precipitate occurred. The combined precipitates were suspended several times in hot alcohol to remove alcohol-soluble impurities. The air-dried and powdered material weighed 275 Gm.

The digitonide thus obtained was decomposed in 15-Gm. portions, with boiling xylene in the usual manner (1). The mixed, impure digitonin was extracted four times with hot 95 per cent alcohol. To the first extraction, while warm, ether was added until the cloudiness first produced just disappeared. Upon cooling, the digitonin crystallized out. The subsequent extractions were concentrated before the ether was added to the warm concentrate. From the mother liquids additional digitonin was obtained by cooling in a salt and ice bath. Subsequently the combined mother liquids were evaporated under vacuum to a syrupy consistence and the residue dissolved in the smallest amount of hot 95 per cent alcohol. The digitonin thus obtained was more highly colored than the products previously separated.

The combined residues of the xylene-treated material in the capsules, after exhaustion with alcohol to remove the liberated digitonin weighed 94 Gm., apparently undecomposed digitonide. This was again treated with xylene but again a residue of 40 Gm. of apparently undecomposed digitonide resulted. A third treatment still yielded a small residue which was set aside temporarily.

The total amount of crystalline, sterol-precipitating material, *i. e.*, digitonin, thus obtained was about 155 Gm. corresponding to 1.16 per cent of the seed. It should be remembered, however, that a small amount of precipitated digitonide was not resolved into its components, also that some of the digitonin had been separated from the alcoholic extract as insoluble digitonide, having been formed during the process of extraction. As yet it has not been ascertained whether the digitonide, removed as previously described, constitutes all of the digitonide formed during the extraction. As previously pointed out it seems reasonable to assume that digitonide may be precipitated in the tissue during the process of extraction, hence may be lost in the marc.

That the 155 Gm. of material, separated as described, consisted of digitonin was demonstrated not only by its method of preparation which is sufficiently specific to exclude other compounds, but by its m. p. 227° to 240° (10) (not very conclusive it is true), its ability to precipitate sterols (quite conclusive), also by a positive Keller color reaction (11).

The defatted alcoholic concentrate from which the digitonin had been precipitated with cholesterol was set aside to be investigated at a later date, if deemed desirable.

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TWO SPECIES OF THE GENUS LEDUM.*

BY RUSSELL A. CAIN AND E. V. LYNN.

Several years ago we reported (1) on the volatile oil of *Ledum grœnlandicum* Oeder., which grows abundantly in the numerous bogs of Washington: We have now collected specimens of this plant from a dry bog near Seattle and examined them more carefully. We have also gathered samples of *L. columbianum* Piper, which is found along the coast of Oregon and Washington. It is differentiated from *L. glandulosum* by some and by others is considered identical. It is distinguished from *L. grœnlandicum* by being glabrous and by its larger, not revolute-margined leaves, which are not tomentose. Like the other species it is reputed to be poisonous to stock, but no one has hitherto investigated it scientifically.

* Scientific Section, A. PH. A., Madison meeting, 1933.

A preliminary study having demonstrated that the composition is little influenced by the wetness of the soil in which the plants grow, the samples were collected at random. They were thoroughly cleaned, allowed to dry in the air and then submitted to a proximate analysis, using the A. O. A. C. methods.

	L. grœnlandicum.		*L. columbianum.*	
	Leaves.	Flowers.	Leaves.	Flowers.
Loss on air-drying	42.22	70.12	62.50	79.55
Loss at 100° C.	6.16	7.53	6.55	8.11
Loss at 110° C.	6.93	8.13	7.44	9.00
Ash	2.76	4.35	4.22	3.97
Ash, acid-soluble	2.69	3.58	3.90	3.71
Selective Extraction.				
Petroleum ether	5.48	3.36	6.61	2.98
Volatile	0.45	0.18	0.54	0.39
Ether	6.33	2.78	4.04	3.06
Volatile	0.24	0.28	0.53	0.41
Chloroform	1.78	1.12	1.40	1.24
Alcohol	34.12	38.39	28.16	31.19
Water	7.56	8.43	14.43	12.32

Alkaloid.—Since the plants are considered poisonous to stock and because the leaves have been employed considerably in medicine and for killing insects, there was a possibility that an alkaloid is the responsible agent. Accordingly 100 Gm. each of the leaves and of the roots of both plants were separately exhausted with alcohol containing 1 per cent of tartaric acid. The resulting solutions were concentrated under reduced pressure to a syrupy consistency, poured into water and filtered. The filtrates were evaporated under reduced pressure to a small volume, made slightly alkaline with ammonia and extracted with 1 per cent sulphuric acid. The acid solutions were treated separately with Wagner's, Marme's, Mayer's and Scheibler's reagents, with gold chloride, picric acid and tannic acid. Since none of these materials gave any precipitate, we conclude that alkaloids are absent from the roots and leaves of these two species.

VOLATILE OIL FROM L. GRŒNLANDICUM.

Immediately after being picked and separated from the stems, some of the leaves were transferred to a large still and subjected to distillation with steam. From 362 pounds there was obtained a total of 226 cc., or 204 Gm. of oil, representing a yield of approximately 0.12 per cent, 0.21 per cent on the dry basis. By a previous maceration with water before distillation, this yield could be increased by about 50 per cent.

The oil was light amber in color, possessed a characteristic odor and was neutral to litmus. On standing it darkened somewhat and the odor became more pronounced. The constants were: d_{25} 0.9031; $[\alpha]_D^{20}$ +1.36°; n_D^{20} 1.4900; acid number 2.46; saponification number 28.81 (ester as bornyl acetate 9.32 per cent); after acetylization 97.20 (combined alcohol as borneol 7.24 per cent, free alcohol as borneol 11.57 per cent); methoxyl value 13.19 (Zeisel method) equivalent to 3.45 per cent of methyl eugenol.

Free Acids.—From 200 cc. of the oil the free acids were extracted by means of five per cent sodium carbonate solution which was washed with ether to remove adhering oil and then evapo-

rated to a small volume. After acidification with sulphuric acid the residue was distilled and acetic acid identified in the distillate by characteristic reactions. It is possible, judging by odor, that there is also a small amount of butyric or valeric acid. The total free acid amounted to about 2.5 per cent.

Phenols.—From the residual oil there was extracted by 5 per cent potassium hydroxide solution 0.49 Gm. of phenols, or 0.27 per cent. The index of refraction at 25° C. was 1.5045. Carvacrol was identified by color reaction with ferric chloride, by the Flückiger test and by the phenyl urethane melting at 135° C. The total amount of phenols in the oil, as determined in a cassia flask, was found to be 11 per cent. Since carvacrol can be extracted from its alkaline solution, the total percentage in the oil may be much more than 0.27.

Levo-α-phellandrene.—The remaining oil was distilled repeatedly up to 105° C. at 35 mm., giving a distillate of 36.5 cc. which was found to be almost entirely α-phellandrene. It boiled at 170–175° C. at atmospheric pressure, had a specific gravity of 0.8628 at 20° C. and a specific rotation in alcoholic solution of −10.45° at 20° C. The nitrite when purified had a melting point of 113° C.

Combined Acids.—The rest of the oil was saponified with alcoholic potash and the alkaline solution was separated carefully and evaporated to a small volume. This was then acidified and distilled and acetic acid was identified in the distillate as before. Apparently there was also at least one more acid in the distillation residue, but it was in very small amount.

The bulk of the oil after saponification was submitted to fractional distillation at 30–35-mm. pressure and repeatedly refractionated. The first 2 cc. were found to be entirely α-phellandrene.

Levo-borneol.—At 140–142° C. there was obtained a crystalline solid and a liquid, both of which gave identity tests for borneol. The melting point of the crude solid was 203° C. and a phenyl urethane could be obtained from either portion melting at 138° C. The specific rotation of an alcoholic solution of the solid was found to be −37.64°, which indicated that the borneol is chiefly levo. It is probably present in the oil, partly free and partly as acetate.

Levo-α-caryophyllene.—The third fraction, boiling at 145–170° C., was found to contain caryophyllene. The blue nitrosochloride melted at 175° C., by rapid heating at 177° C., with decomposition. The nitrosate melted at 166° C. with decomposition, which is somewhat higher than that usually given. The specific rotation in alcoholic solution of this fraction was found to be −5.77°.

Ledum Camphor.—Although all attempts to freeze out this compound from the upper fractions failed, its presence was strongly indicated by the preparation of a phenyl urethane melting at 145° C. Hjelt (2) gives this as 144–145° C. There was also found a small amount of caryophyllene in this same portion. The presence of a ketone, such as was reported by Lomidse (3) in *Ledum palustre*, could not be established.

The highest fraction was dark blue and probably contained azulene. It gave a red solution in syrupy phosphoric acid and with hydrochloric acid in acetic acid solution a red color changing to violet. The crystalline picrate was not obtained.

OIL FROM THE FLOWERS.

From the fresh flowers of *Ledum grœnlandicum* there was obtained by distillation with steam 0.058 per cent of oil, or 0.195 per cent on the dry basis. This was mildly aromatic, of a red color and slightly acid to litmus. The constants were: d_{25} 1.0332; n_D^{20} 1.51025; acid number 28.03; ester number 77.97; after acetylization 161.31. These would indicate a much higher content of alcohols and esters than in the leaf oil.

VOLATILE OIL FROM L. COLUMBIANUM.

From 397 pounds of fresh leaves, collected in June near North Bend, Oregon, there was obtained a total of 704 cc. or 641.4 Gm., which represented a yield of 0.35 per cent, or 0.95 per cent on the dry basis. Previous maceration with water before distillation increased this yield by 60 per cent.

The oil was neutral to litmus, amber in color and possessed a mild odor similar to that from the leaves of *L. grænlandicum*. The constants were: d_{25} 0.9111; $[\alpha]_D^{25}$ +9.13°; n_D^{20} 1.4954; acid number 0.716; ester number 17.83 (6.24 per cent as bornyl acetate); after acetylization 79.56 (combined alcohol as borneol 4.90, free alcohol 12.07 per cent as borneol); methoxy value 10.73 (2.80 per cent as methyl eugenol).

Free Acids.—From 200 cc. of the oil the free acids were extracted by means of 5 per cent sodium carbonate solution as before. Acetic acid was identified in the same way, its amount being less than 0.1 per cent. There was also possibly a small amount of butyric or valeric acids.

Phenols.—Estimated volumetrically by a cassia flask, the amount of phenols was about 5 per cent, but by extraction with alkali and subsequent washing of the latter with ether only 0.15 per cent could be obtained. This had an index of refraction of 1.5134 at 20° C. Carvacrol was identified as before by color tests and by a phenyl urethane melting at 135° C.

From the remaining oil the terpenes were separated by repeated distillation up to 100° C. at 35-mm. pressure. The distillate, amounting to about 60 cc., was then carefully fractionated at ordinary pressure.

Levo-α-pinene.—In the first fraction, boiling point 155–162° C., d_{20} 0.8501, n_D^{20} 1.4700, $[\alpha]_D^{20}$ in alcoholic solution—27.04°, a nitrosochloride was obtained which melted at 103° C. Pinene was further identified by oxidation to pinonic acid whose semicarbazone melted at 204° C.

Levo-α-pinene.—The second fraction, constituting over half of the terpenes, distilled at 162–170° C., d_{20} 0.8553, n_D^{20} 1.4750, $[\alpha]_D^{20}$ −16.85° in alcohol. Oxidation by the method for β-pinene gave an acid melting at 95° C. instead of 125° C. Although none of the other terpenes could be identified, the presence of β-pinene must remain in doubt.

Dextro-α-phellandrene.—The third fraction, boiling at 170–175° C., d_{20} 0.8401, n_D^{20} 1.4772, $[\alpha]_D^{20}$ +26.68°, comprised about 10 per cent of the oil. It consisted almost entirely of phellandrene, nitrite melting at 105° C.

The remainder of the terpene fraction boiled at 175–185° C. and was dextro. Neither dipentene nor limonene could be identified.

Combined Acids.—The oil was saponified with alcoholic potash and the alkaline solution was separated and evaporated to a small volume. After acidifying and distilling, acetic acid was identified in the distillate. There was probably a small amount of other acids, judging by the odor and by the fact that ether extracted a few drops from the residue.

Levo-borneol.—The rest of the oil was submitted to fractional distillation at 30–35-mm. pressure and repeatedly refractionated. The first portion was practically solid and consisted of borneol, melting point 203° C., d_{20} 0.8972, n_D^{20} 1.4891, $[\alpha]_D^{20}$ in alcohol −33.59°, phenyl urethane melting at 138° C. It amounted to about 15 per cent of the total oil.

Levo-α-caryophyllene.—The second fraction, boiling point 170–185° C., d_{20} 0.9082, n_D^{20} 1.5054, $[\alpha]_D^{20}$ in alcohol −1.42°, was found to be caryophyllene. The blue nitrosochloride melted at 177° C. and the nitrosate at 166° C., both with decomposition. The amount was about 10 per cent.

Ledum Camphor.—The third fraction, boiling point 195–200° C., d_{20} 0.9414, $[\alpha]_D^{20}$ +15.27°, n_D^{20} 1.5120, which made up 15 per cent of the oil, gave copious quantities of a phenyl urethane melting at 145° C., which served to indicate ledum camphor. All attempts to freeze out the material failed and at no time could solid ledol be obtained.

As with the oil from *L. grænlandicum*, no semicarbazone could be obtained from any of these fractions, which would seem to indicate that the ketone of Lomidse (3) is not present.

The highest fraction was dark blue probably because of the presence of azulene. Although the characteristic color reactions were obtained as before, no crystalline derivative could be made.

Columbenol.—By subjecting the original oil to a temperature of −15° C. for several hours, there was obtained from it about 10 per cent of crystals which we were unable to identify with any known compound and have tentatively named columbenol. The compound, crystallized from alcohol and then from ligroin, was in the form of beautiful prismatic plates, varying somewhat in general appearance depending upon the solvent. The constants found were: melting

point 55.7° C.; boiling point with some decomposition 277° C.; $n_D^{58.5}$ 1.5169, n_D^{62} 1.5155; $[\alpha]_D$ in 1 per cent alcoholic solution +5.2°; molecular refraction at 20° C. about 73. Analysis gave: Carbon 82.45, 82.70, 82.55, 82.46; hydrogen 10.55, 10.04, 10.17, 10.13 per cent. Calculated for $C_{15}H_{22}O$ requires 82.53 and 10.32 per cent.

Columbenol is colorless, odorless and bland in taste, is neutral to litmus, freely soluble in all of the usual solvents except water or dilute alcohol. It dissolves in sulphuric acid to a red-brown color and in nitric acid to a light brown, both turning gradually darker. A mixture of the two acids gives a violent reaction, finally resulting in an almost black solution. Addition of sulphuric acid to a chloroformic solution gives a deep red color which slowly changes to purple. No chemical derivatives could be prepared, such as phenyl urethane, semicarbazone, oxime, benzoate, etc. Bromine was not decolorized in ether solution notwithstanding that the molecular, refraction indicated an unsaturated compound. It is, therefore, impossible to classify columbenol but since dehydration seemed to form a hydrocarbon, we have assumed that it is a tertiary alcohol of the sesquiterpene series.

OIL FROM THE FLOWERS.

From the fresh flowers of *L. columbianum* was obtained 0.59 per cent of oil or 2.87 per cent on the dry basis. It was neutral, light amber and strongly aromatic, d_{20} 1.0182, $[\alpha]_D^{20}$ in alcohol −8.41°, n_D^{20} 1.5119, acid number 7.27, ester number 23.61 (as bornyl acetate 8.26 per cent), after acetylization 128.65 (combined alcohol 6.49, free alcohol 28.89 per cent as borneol). By freezing, columbenol could be separated from the oil in about the same proportion as in that from the leaf.

ARBUTIN.

This glucoside is reported to be present in some species of *Ledum*, including *L. grœnlandicum* (4), but we have been unable to find any record of its isolation. Uloth obtained hydroquinone by dry distillation, but most of the evidence seems to be based upon color reactions using an aqueous solution.

We have extracted the leaves of both our own species with water in the usual way in order to determine if arbutin is present. After precipitation with neutral and basic lead acetate and removal of the excess lead, the solution was evaporated under reduced pressure to a small volume. Since nothing separated even after some time, the syrupy residue was extracted with spirit of ether and the solvent was evaporated. The addition of ferric chloride to an aqueous solution of the residue gave a dark blue color, while phosphomolybdic acid produced an intense blue in an ammoniacal solution (Jungmann's test). Since these are typical of arbutin, we admit the possibility of its presence, but could not prepare hydroquinone, quinhydrone or quinone from the aqueous residue. In any event the amount must be small because it would otherwise have separated from the evaporated solution. Extraction of uva-ursi in a similar manner gave crystals of arbutin which responded to the above color reactions and yielded readily hydroquinone and its oxidation products.

ERICOLIN.

Throughout the literature are numerous references to a glucoside, ericolin, and to its occurrence in several plants, chiefly ericaceous. It was first separated by Rochleder and Schwarz (5) from the leaves of *Ledum palustre* L. as a brownish yellow resin with an intensely bitter taste. Upon hydrolysis they obtained a volatile oil which Willigk (6) assumed to have the same composition as the oil obtained

directly by distillation with steam. Although others have claimed that about thirty other plants contain ericolin, including *Ledum grœnlandicum*, we can find no reference to actual separation and purification of a glucoside. The only evidence is based upon the oily hydrolytic product, which was given (7) the formula $C_{20}H_{28}O$.

In order to learn more about this substance, we have worked with the aqueous extract as obtained under arbutin, using the leaves of each of our own species. The syrupy residue was extracted by a mixture of alcohol and ether and the resulting solution was dried and evaporated. The residue was made acid with sulphuric acid and distilled with steam, giving a product which had a strong odor typical of the higher fractions previously described. Extraction with ether yielded an amber-colored oil in small amount, n_D^{20} 1.5213 for *L. grœnlandicum*, 1.5130 for *L. columbianum*. In each case there could be prepared from this oil a phenyl urethane melting at 145° C. We conclude from these results that the leaves of both species contain a glucoside which hydrolyzes to give ledum camphor or a similar substance. If this glucoside be the unknown ericolin, which could not be isolated in the pure state, the formula given above for the hydrolytic product may not be right.

TOXICITY.

Emulsions of the two oils were separately fed to adult white rats in increasing doses up to 1.44 Gm. per Kg. weight. Except for some slight irritation during administration, the oils gave no outward physiological effects.

The powdered leaves of each species were rolled with glucose into pills and fed to a rabbit in doses up to 10 Gm. of the leaves per Kg. weight. Again no observable effects were noted.

Finally adult white rats were fed equivalent doses of columbenol, with similar negative results.

We can safely conclude that the leaves and oils of our two species are certainly not poisonous under the conditions here, because the doses used were extraordinarily high.

SUMMARY.

After a partial analysis of the leaves of *Ledum grœnlandicum* and of *L. columbianum*, during which alkaloids were found absent, the volatile oils were more carefully examined.

Fresh leaves of the former yielded 0.12 to 0.18 per cent of oil containing: 20 per cent of l-borneol, partly as acetate; 15 per cent each of l-α-phellandrene, l-α-caryophyllene and ledum camphor; a smaller quantity of phenols, chiefly carvacrol; some free acetic and probably other acids; probably some azulene. The fresh flowers gave 0.058 per cent of oil with much different constants.

Fresh leaves of the other species yielded 0.35 to 0.56 per cent of oil containing: 3 per cent of l-α-pinene; 17 per cent of l-borneol, partly as acetate; 15 per cent each of ledum camphor and an unidentified terpene, probably l-β-pinene; 10 per cent each of d-α-phellandrene, l-α-caryophyllene and columbenol, a stearoptene, probably $C_{15}H_{22}O$; a small amount of phenols, chiefly carvacrol; some free acetic and other acids; probably some azulene. The fresh flowers gave 0.59 per cent of oil with quite different constants and containing about 10 per cent of columbenol.

Contrary to previous reputation, they were found not poisonous to rats or rabbits, even when given in enormous doses.

No evidence could be found for the presence of arbutin which had been claimed as a constituent of *L. grænlandicum*. The glucoside ericolin may be in the leaves of both species, as attested by hydrolysis to an oil probably containing ledum camphor. However, since no one has ever isolated this glucoside in the pure state from any vegetable source, we have doubts as to the uniformity of its composition.

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SEATTLE, WASH.,
June 20, 1933.

DETERMINATION OF CERTAIN MEDICAMENTS UNDER THE INFLUENCE OF LIGHT.*

BY H. V. ARNY, A. TAUB AND R. H. BLYTHE.

I.—INTRODUCTION.

This report covers the third and fourth years of research on the deterioration of chemicals and pharmaceuticals when stored in colored glass containers. A complete report of the work of the years 1929–1931 conducted by Dr. Abraham Steinberg under the personal direction of Professor Abraham Taub and the senior author was presented by Dr. Steinberg as an "Arbeit" submitted in partial fulfilment of the requirements set for the degree of Doctor of Pharmacy of Columbia University, while the material in condensed form was published as a paper by Arny, Taub and Steinberg in the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 20 (1931), 1014 and 1153.

During 1931–1932, a second fund of $2000 was raised to continue the work where it was discontinued by Dr. Steinberg. The second fund of $2000 was obtained through the generosity of the following firms and organizations:

Subscriptions of $100 each from Burroughs Wellcome & Co., London and New York; Dow Chemical Co., Midland, Michigan; Hynson, Westcott and Dunning, Baltimore, Md.; Lehn & Fink, Bloomfield, N. J., and New York City; Merck & Co., Rahway, N. J., and New York City; Charles Pfizer & Co., Brooklyn and New York City; Smith, Kline & French Laboratories, Philadelphia, Pa.; E. R. Squibb & Sons, Brooklyn and New York City; the Upjohn Co., Kalamazoo, Mich.; and the Proprietary Association.

A subscription of $200 from William R. Warner & Co., Inc., New York.

A grant of $300 from the Breitenbach Fund of the College of Pharmacy of the City of New York. A grant of $500 from the Board of Trustees of the U. S. Pharmacopœial Convention.

As research fellow for 1932–1934, the senior author selected Rudolph H. Blythe, B.S., who gave the subject his devoted attention during two years as a stu-

* Joint Session, Scientific Section and Section on Practical Pharmacy and Dispensing, Washington meeting, 1934.

dent of the graduate course of the College of Pharmacy of Columbia University. His efforts won the degree of Doctor of Pharmacy of Columbia in June 1934, and in fulfilling the requirements set for the degree, Dr. Blythe submitted an inaugural dissertation of 168 typewritten pages. The present paper represents a condensation of the Blythe "Arbeit."

In connection with the research, the following firms donated bottles, chemicals and pharmaceuticals:

Charles Cooper & Co., Corning Glass Works, Dodge & Olcott Co., Fritzsche Bros., Inc., Heine & Co., Eli Lilly & Co., Mallinckrodt Chemical Works, Maryland Glass Corporation, Merck & Co., Monsanto Chemical Works, New York Quinine and Chemical Works, Owens-Illinois Glass Co., Charles Pfizer & Co., Schieffelin & Co., Sharp & Dohme, Smith, Kline & French Laboratories, E. R. Squibb & Sons and W. R. Warner & Co.

To these firms we are very grateful.

II.—PHYSICAL MEASUREMENTS.

(A. Taub and R. H. Blythe.)

As in the case of the Steinberg research of 1929–1931 each type of bottle used was submitted to spectrophotometric readings by means of the Bausch and Lomb apparatus of the physics laboratory of the College of Pharmacy. This instrument gave measurements from 400–800 mμ. For transmission values in the ultraviolet region, we employed a Hilger quartz spectrograph, kindly placed at our disposal by the Department of Physics of Columbia University. Our readings gave practically the same values as reported on the graphs shown in the Steinberg paper of 1931. This is not surprising since the bottles employed were furnished by the same firms who contributed their glassware for the 1929–1931 investigation. While there has been during the past two years considerable talk about new types of glass bottles, numerous requests on our part failed to bring us practical samples of new types. The six types of bottles used by us represent the average run of the bottle market of to-day, as applied to the drug trade.

III.—DETERIORATION OF CHEMICALS AND PHARMACEUTICALS.

(H. V. Arny and R. H. Blythe.)

The procedure in the 1932–1934 investigation was identical with that described in the Steinberg paper of 1931. All chemicals studied were subjected to a complete physical and chemical examination as prescribed by the U. S. P. or the N. F. and all pharmaceuticals were either prepared by Mr. Blythe or were tested by him as per standards set by the Pharmacopœia or the Formulary. In all but a few special cases, the observed substance was placed in a pyrex tube which in turn was placed in a colored container that was being studied. The medicaments were then observed under the following conditions:

(1) 15 liquids and 13 solids (all of U. S. P. or N. F. strength and quality when prepared or received) were stored in pyrex test-tubes (or ampuls) and these tubes placed into commercial glass containers (2 flint, 2 amber, 1 blue and 1 green). Five sets of these specimen chemicals (1300 samples in all) were exposed to light on the roof of our College building, in cases protected by a single sheet of window glass.

(2) One set of specimens (225 samples in all) was exposed in diffused light in cases in the office of the senior author.
(3) One set (170 samples in all) was kept in a closet in our dark room.
(4) Of the five sets on the roof, one was brought in after one month's exposure and studied. The second set was examined after two months' exposure. The third, fourth and fifth sets were examined after exposures representing 4, 6 and 12 months, respectively.

As to our results, we submit three tables of comparison; two based upon exposure to light during one year. Results obtained after exposure for 1, 2, 4 and 6 months will be found in the original Blythe "Arbeit." As to these tables, the first discusses, in general terms, the effect of direct light, diffused light and darkness upon the chemicals examined. The second table gives degree of deterioration when the chemicals were exposed in diffused (day) light for one year; while the third table shows time limit of stability when exposed to direct (sun) light. The first 10 chemicals in Table II were assayable, hence the change can be expressed mathematically. The others on the list were judged by the degree of color change or by special types of qualitative tests.

TABLE I.—GENERAL FINDINGS AS TO DETERIORATION.

Exposure for 1 Year.

Stable in All Types of Glass Containers under All Conditions.	Stable in All Conditions of Diffused Light.	Unstable in Light; Stable in Dark.
*Ferrous carbonate, saccharated	Acetyltannic acid	Aloin
Solution of picric acid (1%)	Chloramine	*Quinidine sulphate
	Dichloramine	*Quinine
Unstable in All Conditions of Light and Darkness.	Gallic acid	*Quinine sulphate
	Liquid petrolatum	
*Elixir of glycerophosphates, compound	*Solution of ferric chloride	
*Elixir of iron, quinine and strychnine	*Solution of formaldehyde	
*Nitric acid	Strontium salicylate	
*Compound solution of iodine	Tannic acid	
*Oil of bitter almond		
*Syrup U. S. P.		
Compound syrup of hypophosphites		

* See special notes following tables.

TABLE II.—DEGREE OF DETERIORATION IN GLASS CONTAINERS AFTER ONE YEAR OF EXPOSURE IN DIFFUSED LIGHT.

Group A.

Percentage of Deterioration Shown by Actual Assay.

	Amber A.	Amber B.	Blue.	Green.	Flint A.	Flint B.
Chloramine	0%	0%	0.7%	0.7%	0.7%	0.7%
Dichloramine	1.2%	0%	3.7%	0.8%	2.1%	2.8%
Ferrous carbonate saccharated	9.1%	8.4%	8.4%	8.4%	0.6%	0.7%
*Nitric acid	21.5%	17.2%	16.9%	14.2%	11.5%	16.9%
Oil of bitter almond	11.0%	11.4%	12.8%	10.8%	10.1%	....
*Solution of ferric chloride	1.4%	1.5%	1.5%	1.6%	1.9%	0.6%
*Solution of formaldehyde	0.3%	G	G	0.4%	0%	0.4%
Solution of iodine, compound	50%	46%	46%	63%	60%	....

Solution of picric acid (1%)	0%	0%	0%	0%	0%	0%
*Syrup U. S. P.	15%	13%	6%	7%	22%	....

* See special notes following tables.

Group B.

Deterioration Shown by Color Change or by Special Tests.

Abbreviations.

C.D.—considerable darkening. S.D.—slight darkening. V.S.D.—very slight darkening. N.C.—no change.

	Amber A.	Amber B.	Blue.	Green.	Flint A.	Flint B.
Acetyltannic acid	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
Aloin	N.C.	N.C.	V.S.D.	V.S.D.	V.S.D.	V.S.D.
Elixir of glycerophosphates, compound	S.D.	V.S.D.	V.S.D.	S.D.	S.D.	S.D.
Elixir of iron, quinine and strychnine	S.D.	S.D.	C.D.	C.D.	C.D.	C.D.
*Ferrous carbonate saccharated	V.S.D.	V.S.D.	V.S.D.	V.S.D.	V.S.D.	V.S.D.
Gallic acid	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
Oil of bitter almond	S.D.	V.S.D.	V.S.D.	V.S.D.	V.S.D.	....
Quinidine sulphate	N.C.	N.C.	V.S.D.	V.S.D.	V.S.D.	V.S.D.
Quinine	N.C.	N.C.	V.S.D.	V.S.D.	V.S.D.	V.S.D.
Quinine sulphate	N.C.	N.C.	V.S.D.	V.S.D.	V.S.D.	V.S.D.
Strontium salicylate	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
Syrup of hypophosphites, compound	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.
Tannic acid	V.S.D.	V.S.D.	V.S.D.	V.S.D.	V.S.D.	V.S.D.

* See special notes following tables.

TABLE III.—SPEED OF DETERIORATION IN GLASS CONTAINERS EXPOSED IN DIRECT (SUN) LIGHT.

(Expressed in Months.)

Abbreviation: "−1" means less than 1 month.

	Amber A.	Amber B.	Blue.	Green.	Flint A.	Flint B.
Acetyltannic acid	4	4	4	4	4	4
Aloin	−1	−1	−1	−1	−1	−1
Chloramine	2	2	−1	1	1	1
Dichloramine	2	2	−1	−1	−1	−1
*Elixir of glycerophosphates, compound	1	1	−1	−1	−1	−1
Elixir of iron, quinine and strychnine	1	1	−1	−1	−1	−1
Ferrous carbonate, saccharated	12	12	12	12	12	12
Gallic acid	12	12	1	1	1	1
Liquid petrolatum	6	6	2	2	2	2
Nitric acid	2	2	1	1	1	1
*Oil of bitter almond	12	12	−1	−1	−1	−1
*Quinidine sulphate	2	2	−1	−1	−1	−1
Quinine	2	2	−1	−1	−1	−1
Quinine sulphate	2	2	−1	−1	−1	−1
*Solution of ferric chloride	2	2	1	1	1	1
*Solution of formaldehyde	6	12	6	6	12	12
*Solution of iodine, compound	−1	−1	−1	−1	−1	−1
Solution of picric acid (1%)	12	12	12	12	12	12
Strontium salicylate	6	6	2	2	2	2
*Syrup U. S. P.	4	4	2	2	2	2
Syrup of hypophosphites, compound	1	1	1	1	1	1
Tannic acid	2	2	1	1	1	1

* See special notes following tables.

IV.—PECULIARITIES OF CERTAIN CHEMICALS.

Elixir of Glycerophosphates, Compound.—This preparation darkens in diffused light and deposits a precipitate in sunlight. It even darkens when kept in a dark place. Amber glass is the best protective.

Elixir of Iron, Quinine and Strychnine is another pharmaceutical that readily deteriorates. This deterioration appears to be essentially a photochemical change, the preparation being especially susceptible to rays below 4800 Å. The ferric salt appears to act as a sensitizer and is itself affected by the light rays. As reported by Fry and Gerwe some years ago, the citric acid of the citrate is partially broken down to carbon dioxide and acetone, while some of the ferric ions are reduced to the ferrous form. This preparation should be submitted to long and intensive study.

Ferrous Carbonate, Saccharated.—This preparation is one which sunlight improves. Our ferrous assays indicate the greatest deterioration after storing in the dark and the least in the sunlight. In diffused light, flint glass is a better protective than amber glass. When stored in loosely stoppered bottles, the reducing action of light seems counteracted by the oxidizing action of the air.

Fluidextract of Ergot.—In the original plan the deterioration studies of this fluidextract and also tinctures of aconite and digitalis were started. Lacking facilities for pharmacologic assaying and failing to find what were to us, satisfactory colorimetric tests, work on these three pharmaceuticals was postponed.

Nitric Acid.—The erratic results obtained in the study of this chemical were largely due to evaporation. In all cases of exposure to light, the acid suffered serious loss in strength. Color of glass container had apparently little influence except that amber was the best protective. Sample stored in the dark in its original glass-stoppered container for one year lost only 1 per cent of HNO_3.

Oil of Bitter Almond was studied from its change in color, from its loss of benzaldehyde and from its deposition of benzoic acid crystals. Decrease in benzaldehyde occurred even in the dark; being about 9 per cent loss within 1 year. Direct sunlight produces as much as 50 per cent deterioration except when the oil is stored in amber bottles.

Quinidine Sulphate, Quinine and *Quinine Sulphate* are uniformly stable when stored in the dark. In the light, amber glass affords the best protection.

Solution of Ferric Chloride keeps fairly well in diffused light; almost as well as when stored in the dark. In sunlight, ferrous iron begins to appear within one or two months.

Solution of Formaldehyde.—In diffused light, this solution suffers little or no loss in strength. In fact, as shown in Table II, Group A, two samples (those indicated by the letter "G") actually gained a fraction of 1 per cent in strength; due undoubtedly to evaporation of the solvent.

Solution of Iodine, Compound.—When stored in containers provided with cork or rubber stoppers, deterioration proceeded rapidly whether stored in light or dark. On the other hand, a sample stored in the dark in a glass-stoppered bottle during one year showed only little or no deterioration. Likewise a sample sealed in an ampul and exposed to sunlight for 4 months suffered no loss in strength.

Syrup U. S. P.—Our experiments were based upon degree of inversion. Those

samples exposed to sunlight showed inversion within 4 months. Samples stored in the dark for one year, indicated over 10 per cent inversion. The sample exposed to diffused light for one year in the second type of flint bottle gave such a discrepant figure that it is omitted from the table.

Syrup of Hypophosphites, Compound.—The color of this preparation darkens even when stored in the dark. The darkening is greater in sunlight than in diffused light. The deterioration is evidently an oxidation phenomenon. In sunlight, precipitation occurs, while in diffused light and in the dark, the darkening of the color is the only indication of change. Color of glass container has evidently little or no influence.

Tincture of Aconite and *Tincture of Digitalis.*—See Fluidextract of Ergot.

Lard, Expressed Oil of Almond and *Ointment of Rose Water, U. S. P.* were studied from the standpoint of rancidity. While no authoritative statements may be made by us concerning this annoying phenomenon we venture to express the following opinions:

(*a*) Rancidity progresses in the dark as well as in the light.
(*b*) In actual practice, the color of the glass container seems of little importance.
(*c*) Oxygen (of the air) and moisture are essential factors in producing rancidity. Light acts as an accelerator but is not an essential factor in the reaction.

V.—BIBLIOGRAPHY.

Dr. Blythe's dissertation includes a bibliography of 162 titles. Limitations of space prevent its inclusion in this paper.

VI.—CONCLUSIONS.

(1) Amber glass affords the most protection of any glass now commercially available.

(2) Red and green Corning filters, used as described in our paper of 1931, offer the greatest protection of any glass tried. These are not, however, available as commercial glass containers.

(3) The ordinary easily available green glass containers are not, however, as good protectives for medicaments as is amber glass.

(4) The following tables summarize the Steinberg and the Blythe studies of the deterioration of 50 medicaments classified as to causes of deterioration: (*a*) light, (*b*) simple volatilization, (*c*) chemical changes produced by factors other than light. In the first table "A" indicates that amber glass was the best protective; while "G" means that green glass also acted as protective.

(A) Deterioration Due to Light.

Acetyltannic acid	A	Hydriodic acid syrup	
Adrenalin hydrochloride	A	Hydrobromic acid	
Aloin	A	Liquid petrolatum	A
Benzoic acid	A	Mercuric oxide, red	
Betanaphthol	A & G	Mercuric oxide, yellow	
Chloroform	A & G	Mercurous chloride	A & G

Chloramine	A
Dichloramine	A
Ephedrine hydrochloride	
Ether	A & G
Ferric chloride solution	
Ferric citrate	
Ferric phosphate soluble	A
Ferric pyrophosphate soluble	A & G
Formaldehyde solution	
Gallic acid	A
Hydriodic acid	
Mercurous iodide	
Pyrogallol	A & G
Quinidine sulphate	A
Quinine	A
Quinine sulphate	A
Resorcinol	A & G
Santonin	A & G
Strontium salicylate	A & G
Tannic acid	A
Thymol iodide	A & G

(B) To Volatilization.

Hydrocyanic acid diluted
Nitric acid
Solution of chlorinated soda
Solution of chlorine, compound
Solution of iodine, compound
Spirit of ethyl nitrite

(C) To Chemical Changes Produced by Factors Other Than Light.

Apomorphine hydrochloride
Elixir of glycerophosphates, compound
Elixir of iron, quinine and strychnine
Oil of bitter almond
Physostigmine salicylate
Silver nitrate
Solution of arsenous and mercuric iodide
Solution of hydrogen dioxide
Sulphurated potassa
Syrup U. S. P.
Syrup of hypophosphites, compound

(D) Stable to Light.

Ferrous carbonate saccharated[1]
Ferrous iodide, syrup[1]
Mercuric iodide, red
Liquefied phenol
Picric acid solution (1%)[2]
Silver proteins (mild and strong)

VII.—UNSOLVED PROBLEMS.

A research of the character just described usually brings in its trail a series of questions more puzzling than the original investigation. We have studied the 50 medicaments as summarized above and we find that among these 33 cases of deterioration due to light, 6 due to volatilization and 11 due to chemical changes produced by factors other than light. These bare facts immediately inspire such questions as (*a*) How does the light react upon the chemical? (*b*) Why does syrup hydrolyze in the light and to a lesser extent in the dark? (*c*) Why does lard turn rancid in the dark as well as in the light?

These queries coming within our ken, set us to work on certain experiments which we hoped would explain some of the phenomena observed, but up to the present time, the results of this phase of our work have been far from satisfactory. Hesitatingly we raise the following questions:

(1) Of the many possible causes of deterioration the four outstanding are heat, light, air and moisture. Is it possible that air and moisture play a more important rôle in the deterioration phenomena than does light?

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[1] Actually improved by action of light rays.

[2] When preserving catalyst is present.

(2) In the case of the average light-sensitive chemical, does light act directly or merely as an accelerator of oxidation or reduction?

(3) In certain cases, notably the halide salts of such metals as silver, mercurous mercury and iron, the reducing action of light is clearly discernible. Thus photographic studies have cleared up the situation as far as the silver halides are concerned. Will further investigations of other metallic compounds indicate definitely which deteriorations due to light are reducing and which are oxidizing phenomena?

(4) In rancidity, is not the deterioration due to presence of air and moisture rather than to light?

We hope in the near future to make further efforts toward answering these interesting questions.

COLLEGE OF PHARMACY,
COLUMBIA UNIVERSITY,
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THE STABILIZATION OF SYRUP OF FERROUS IODIDE, U. S. P. X.*,[1]

BY WILLIAM J. HUSA[2] AND LYELL J. KLOTZ.[3]

INTRODUCTION.

Ferrous iodide was discovered by Courtois (1) who reported its preparation in 1811. It was introduced into medicine in 1824 by Dr. Pierquin (2) who used the chemical as prepared by Caillot (3), a French pharmacist. In 1831, Pierquin (4) published formulas for the administration of ferrous iodide in the form of a water, chocolate, pastille, salve, tincture and wine and added that 2 oz. of the salt in sufficient water might be used for bathing. The voluminous literature concerning Syrup of Ferrous Iodide has been adequately reviewed (5). The purpose of the present investigation was to evaluate previous work, determine the mechanism and rate of decomposition and effect a satisfactory method of stabilization.

EXPERIMENTAL.

Chemicals and Reagents.—Two kinds of iron wire were employed, *i. e.*, card teeth and Merck's Reagent Iron. The former assayed 99.6% iron and contained 0.07% of sulphur as well as some carbon and silicon; the latter showed 99.9% iron and contained 0.05% sulphur as well as traces of silicon. Sulphur was determined by the cadmium acetate absorption method (6).

Mallinckrodt's U. S. P. and Merck's C.P. and Reagent Iodine were used. Mallinckrodt's U. S. P. Hypophosphorous Acid assaying 31.04% H_3PO_2 was employed. Colgate's C.P. glycerin; Merck's C.P. dextrose and U. S. P. Honey were used. The sucrose satisfied all U. S. P. requirements; its specific rotation at 22° C. was 66.15 determined according to the U. S. P. method. Distilled water having a p_H of 5.7 was used throughout.

General Methods.—All volumetric and gravimetric work was carried out using calibrated weights and apparatus. The progress of decomposition was followed in most cases by titration of free iodine using approximately 0.01*N* solution of sodium thiosulphate and freshly prepared starch T.S.

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[1] This paper is based on a dissertation submitted by Lyell J. Klotz to the Graduate Council of the University of Florida in partial fulfilment of the requirements for the degree of Doctor of Philosophy, June 1934.

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Assays for total iodide were performed by the U. S. P. method using approximately 0.1*N* silver nitrate V.S. and titration with approximately 0.1*N* potassium thiocyanate V.S. according to the Volhard method.

Since ferrous iron cannot be determined in solutions of an iodide by means of permanganate and the dichromate method is tedious and unsatisfactory, a modified permanganate method was developed. This method consisted in the addition of excess silver nitrate to the sample, thus precipitating the iodide, and subsequent determination of ferrous iron with potassium permanganate V.S. The procedure was as follows: An accurately measured quantity of the solution to be assayed is placed in a flask and a slight excess of 0.5*N* silver nitrate solution added after dilution of the sample with distilled water. An excess of Diluted Sulphuric Acid is then added and the mixture titrated with potassium permanganate V.S. The validity of this method was established by standardization of a permanganate solution against weighed quantities of ferrous ammonium sulphate, separately and in mixtures containing iodine, iodides, ferric iron or combinations of these substances.

Hydrogen-ion concentrations were determined by means of a La Motte block comparator and color standards, the hydrogen electrode and the quinhydrone electrode being unsuitable for use with ferrous salts.

Storage of solutions and syrups was made in ordinary prescription bottles or in bottles of comparable alkalinity. A Freas thermostat maintaining a temperature of 30° C. ± .01°, a Freas electric oven maintaining a temperature of approximately 50° C. and an electric refrigerator maintaining a temperature of about 6° C. were employed.

The effects of various spectrum bands were obtained by the use of a series of light filters obtained from the Corning Glass Works. Quartz flasks were used for determinations involving ultraviolet light.

Variations in Reaction Time.—It has been stated that despite the simplicity of this reaction, the direct union of iron and iodine in aqueous solutions does not proceed uniformly to completion in various instances (7). Solutions of ferrous iodide were prepared from card teeth and from iron wire (Reagent grade) using various grades of iodine, and the reaction vessel was maintained in every case at constant temperature ranging between 21° and 26° C. for various samples. Efficient, uniform mechanical stirring was provided and the end-point taken as the time at which the solution was free from iodine. In no case was there a significant difference in the time of reaction. Ten solutions were prepared, the time ranging from one hour and twenty-five minutes to one hour and fifty minutes. The addition of carbon to solutions prepared from Reagent iron did not alter the reaction time. Insoluble residues from card teeth solutions were invariably black in color; those from Reagent iron samples were light brown.

The Effect of Variations in Manufacture.—The U. S. P. X directions for the manufacture of Syrup of Ferrous Iodide allow considerable latitude in interpretation. The phrase "cooling the flask as necessary" implies that volatilization of the iodine should be prevented, but no definite instructions as to the reaction temperature are given. Similarly, the end-point of the reaction is not well defined. It was found in this investigation that the green color so eagerly sought in this preparation is due, not to the salt at the concentration present, but to the presence of minute traces of iodine. In the preparation of aqueous solutions, this is best avoided by allowing sufficient time for the reaction and testing for the end-point with starch T.S. before subsequent application of heat.

In this investigation, solutions of ferrous iodide were prepared by direct union using various grades of chemicals and by double decomposition. In the direct

union reaction, various degrees of heat were used during the progress of the reaction and at its completion. No visible differences were apparent in the finished preparations. On the other hand, these solutions had different p_H values, contained different quantities of iron and left different types of residues upon filtration of the reaction mixtures.

Using card teeth as the source of iron, it was found that regardless of the amount of heat employed or the quality of the iodine used, the p_H varied between p_H 3.2 and p_H 4.2 with the usual value at p_H 3.2 for the preparation of 2 liters of solution. On the other hand, a variation between p_H 3.4 and p_H 4.7 was noted in the case of samples prepared from Reagent iron. In this case, the usual value was p_H 4.1. These values resulted from 30 determinations.

Solutions prepared by double decomposition between Mallinckrodt's barium iodide and Merck's Reagent ferrous sulphate varied between p_H 3.2 and p_H 4.7.

Residues from card teeth samples were invariably black in color while those from Reagent iron were light brown. The former residues were apparently carbon and the latter were ferric hydroxide.

The formation of ferrous iodide from iron and iodine has always been considered to be a simple direct union reaction. However, as the reaction proceeds, hydrolysis of the product occurs thus giving rise to hydrogen ions and iodide ions. Since iron reacts according to the equation:

$$Fe + 2\,H^{+} \rightleftharpoons Fe^{++} + H_2$$

it was thought that the solution might contain iron in excess of the quantity calculated from the iodide content. Gravimetric determinations of the amount of iron remaining unconsumed after expiration of the reaction indicated that more iron was used than could be accounted for upon the basis of the iodide content of the solution. Volumetric analyses of the solutions further indicated that this excess iron appeared in the solution. The excess amounted to approximately 2×10^{-3} mols/L. of ferrous iron in the case of card teeth solutions and approximately 8×10^{-3} mols/L. of ferrous iron in the case of the Reagent iron samples.

An analysis of the residues remaining after filtration of the reaction mixture indicated that nearly twice as much iron was present in the ferric state in Reagent iron samples as in card teeth residues. In solutions prepared from Reagent iron in an atmosphere of pure hydrogen, however, the quantity of ferric hydroxide formed was negligible.

The addition of carbon and ferrous sulphide to reaction mixtures of Reagent iron and iodine did not have any significant effect upon the p_H values of the resulting solutions.

Previous washing of the card teeth used with strong alkali solutions and dilute acid, did not alter the results as outlined above.

The Evolution of Gases.—It has been suggested that reduction of the carbon present as impurity in the iron results in the formation of unsaturated hydrocarbons. On the other hand, it appeared possible that if carbon acts as a reducing agent, carbon dioxide might be formed.

The gases were passed through standardized potassium permanganate solutions in certain instances and through lime water in others. Negative results were

obtained in every case with both Reagent iron and card teeth. The addition of carbon to Reagent iron reaction mixtures was without effect.

The Variation of Hydrogen-Ion Concentration with Time.—As a result of 50 experiments, it was found that regardless of the form of iron or iodine used or of the original p_H value of the solution, the p_H dropped rapidly to p_H 3.2. No further changes occurred during the observation period of 1 year. Precipitation accompanied this drop in p_H value although it continued after the hydrogen-ion concentration had reached stability. It was found that solutions of high p_H, *i. e.*, 4.1 or higher, remain at that point for some time before gradually becoming more acidic. Tests showed that ferrous sulphate solutions of comparable concentration exhibit a similar behavior.

The Hydrolysis of Ferrous Iodide.—Since ferrous iodide is the salt of a weak base and strong acid, it is logical to expect hydrolysis to occur. Despite this fact, the U. S. P. VIII specified that the preparation should be neutral in reaction. The ionization constant for the base concerned is not available in the literature, consequently, experimental determinations were necessary in order to determine the degree of hydrolysis. Obviously, it is possible for hydrolysis to occur in either of two ways:[1]

$$\begin{array}{ll} \text{(I)} & FeI_2 + HOH \rightleftharpoons Fe(OH)I + HI \\ \text{(II)} & FeI_2 + 2HOH \rightleftharpoons Fe(OH)_2 + 2HI \end{array}$$

wherein the mechanism of equation (I) is represented by the ionic equilibria:

$$\begin{array}{ll} \text{(III)} & (FeI)^+ + (OH)^- \rightleftharpoons Fe(OH)I \\ \text{(IV)} & (H)^+ + (OH)^- \rightleftharpoons HOH \end{array} .$$

which may be combined in the simple equilibrium equation:

$$\text{(V)} \qquad (FeI)^+ + HOH \rightleftharpoons Fe(OH)I + (H)^+$$

Applying the Law of Mass Action to equation (III), denoting concentrations by square brackets and neglecting activity coefficients,

$$\text{(VI)} \qquad K_h = \frac{[FeI^+]\,[OH^-]}{[Fe(OH)I]}$$

Since $(OH)^- = K_w/(H)$, where K_w is the ion product of water, equation (VI) may be written:

$$\text{(VII)} \qquad \frac{K_w}{K_h} = \frac{[Fe(OH)I]\,[H^+]}{[FeI^+]}$$

Upon making the simplifying assumptions that the salt and acid are completely ionized, letting v be the molar dilution of salt and z be the fraction hydrolyzed, then:

$$[FeI^+] = 1 - z/v; \quad [H^+] = [Fe(OH)I] = z/v$$

whence[2] we have from equation (VII),

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[1] Similar expressions for salts containing multivalent ions were developed by Denham (8).

[2] This expression is true only if we neglect the hydrogen-ion concentration of the water used. The latter, however, is small compared with that furnished by the hydrolysis of the salt. Such an assumption is usually made in cases of this kind.

$$\text{(VIII)} \qquad \frac{K_w}{K_{h_1}} = \frac{z^2}{v(1-z)} = K_1$$

If, on the other hand, we treat equation (II) similarly, we have, using identical nomenclature,

$$\text{(IX)} \qquad \frac{K_w^2}{K_{h_2}} = \frac{[Fe(OH)_2]\,[H^+]^2}{[Fe^{++}]}$$

In this case, however,

$$[Fe^{++}] = 1 - z/v; \quad [Fe(OH)_2] = z/v; \quad [H^+] = 2z/v$$

and, substituting these values in equation (IX),

$$\text{(X)} \qquad \frac{K_w^2}{K_{h_2}} = \frac{4z^3}{v^2(1-z)} = K_2$$

Thus, since K_w may be taken as approximately 1×10^{-14}, $[H^+]$ can be determined experimentally and v is known, it is possible to calculate definite values for z, K_1 and K_2. A constant set of values for K_1 is taken as evidence of the applicability of equation (VIII) and similar values for K_2 indicate that equation (X) may be applied.

A solution of ferrous iodide was prepared in an atmosphere of hydrogen, using Reagent grade chemicals and recently boiled, distilled water. One-half of this solution was allowed to stand until p_H 3.2 was attained; the other was immediately treated. Both solutions were subjected to a series of dilutions, the p_H values being determined at each dilution and the values of z, K_1 and K_2 calculated in each case. These data follow in Tables I and II wherein the column 100 z refers to the degree of hydrolysis on the basis $z = v\,[H^+]$, since equation (VIII) was found applicable.

TABLE I.—DEGREE OF HYDROLYSIS OF AQUEOUS SOLUTIONS OF FERROUS IODIDE.

Freshly Prepared Solution.

Conc. Mols/L.	v.	p_H.	$[H^+]$.	100 z.	$K_1 \times 10^7$.	$K_2 \times 10^7$.
0.235000	4.255	4.20	6.31×10^{-5}	0.027	0.17	0.53
0.117500	8.511	4.35	4.47×10^{-5}	0.038	0.17	0.38
0.058750	17.022	4.70	2.00×10^{-5}	0.034	0.07	0.07
0.029375	34.044	4.95	1.12×10^{-5}	0.038	0.04	0.02
0.014688	68.088	5.05	8.91×10^{-6}	0.061	0.05	0.02
0.007344	136.176	5.15	7.08×10^{-6}	0.096	0.07	0.02
0.003672	272.352	5.20	6.31×10^{-6}	0.172	0.11	0.03

TABLE II.—DEGREE OF HYDROLYSIS OF AQUEOUS SOLUTION OF FERROUS IODIDE.

Solution Allowed to Stand until Equilibrium at p_H 3.2 Reached.

Conc. Mols/L.	v.	p_H.	$[H^+]$.	100 z.	$K_1 \times 10^9$.	$K_2 \times 10^{11}$.
0.23600	4.238	3.15	7.08×10^{-4}	0.30	2.12	75.23
0.11800	8.476	3.55	2.82×10^{-4}	0.24	0.67	9.49
0.05900	16.952	3.80	1.59×10^{-4}	0.27	0.43	3.38
0.02950	33.904	4.05	8.91×10^{-5}	0.30	0.26	1.20
0.01475	67.808	4.30	5.02×10^{-5}	0.34	0.17	0.43
0.00738	135.616	4.40	3.98×10^{-5}	0.54	0.21	0.42

(To be continued.)

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A COMPARISON OF NEOARSPHENAMINE AND SULPHARSPHENAMINE WHEN THEY ARE DIALYZED.*

BY A. E. JURIST AND W. G. CHRISTIANSEN.

It is well known that both neoarsphenamine and sulpharsphenamine are colloids, at least in part. Several investigators have subjected neoarsphenamine to dialysis and thereby demonstrated this fact. Extensive investigations have been made on neoarsphenamine by Freundlich, Stern and Zocker (1), Hirschfelder and Wright (2), and Raiziss and Gavron (3), but none of these investigators have compared neoarsphenamine and sulpharsphenamine. In this paper we shall describe a method for carrying out the dialysis of neoarsphenamine or sulphars-

* Section on Practical Pharmacy and Dispensing, Madison meeting, 1933.

phenamine under anærobic conditions and the results obtained when this method is used.

These results show a very distinct difference in the behavior of these two compounds upon dialysis. When neoarsphenamine is dialyzed for twenty-four hours with running water 61.4% of the arsenic and 17.5% of the sulphur remain in the dialysis bag; these are averages from a number of experiments with a single brand of neoarsphenamine in which the undialyzable arsenic varied between 51.7 and 75.5% and the undialyzable sulphur between 13.6 and 21.7%. During the dialysis a precipitate forms in the originally clear solution; this precipitate dissolves upon addition of sodium hydroxide and re-forms when CO_2 is passed into the alkaline solution. On the other hand sulpharsphenamine shows only 39.7% of the arsenic and 28.9% of the sulphur still undialyzed; these are averages of several experiments with a single brand of sulpharsphenamine in which the undialyzable arsenic varied between 28.0 and 55.18% and the undialyzable sulphur between 16.7 and 35.77%. Sulpharsphenamine solutions remain clear throughout the dialysis.

Since the per cent arsenic lost by dialysis of sulpharsphenamine is greater than with neoarsphenamine and since the reverse is true for the sulphur content, there is strong evidence that a distinct difference exists in the structures of neoarsphenamine and sulpharsphenamine. This fact was first pointed out by Jurist and Christiansen (4). However, in addition to the differences in the chemical structure of these compounds a distinct dissimilarity in colloidal character is indicated. This can be ascribed either to the fact that the colloidal particles of neoarsphenamine are much larger than those of sulpharsphenamine or to the fact that a much larger portion of the latter is in the true solute form. The latter is the more probable explanation since the dialyzing membrane used here is of a type which usually retains colloids even when highly dispersed.

In addition to these experiments on a single brand of neoarsphenamine and a single brand of sulpharsphenamine a series of experiments were carried out on single lots of the different market brands of neoarsphenamine. The results of these experiments are briefly summarized in the following tabulation.

Brand of Neoarsphenamine.	% of Original Arsenic Undialyzed.	% of Original Sulphur Undialyzed.	Condition of Undialyzed Solution.
A	76.8	16.4	Precipitated
B	44.9	11.2	Clear
C	73.9	10.4	Precipitated
D	63.0	19.0	Precipitated
E	57.7	9.8	Precipitated
F	29.3	21.5	Clear
G	54.6	14.8	Precipitated

These results show wide variations in the undialyzable arsenic ranging from 29.3% to 76.3% and definite, but smaller differences in the undialyzable sulphur ranging from 9.8 to 21.5%. The results obtained with brands "C" and "G" are very similar to those obtained with sulpharsphenamine and further these two brands show one of the other characteristics of sulpharsphenamine, namely, that the undialyzed solution is clear and not precipitated. This series of experiments further emphasizes the fact that there are wide differences between different brands of neoarsphenamine, especially since two brands show characteristics more like those of sulpharsphenamine than neoarsphenamine. The differences in the chemi-

cal composition of market brands of neoarsphenamine pointed out by Elvove (5) and by Jurist and Christiansen (6) appear to extend also to differences in behavior on dialysis.

EXPERIMENTAL.

A solution of 6 Gm. of Parlodion (DuPont) in 50 cc. of ether and 50 cc. of ethyl alcohol is prepared according to the directions of Eggerth (7). This solution is poured into a clean, dry 500-cc. Erlenmeyer flask, and by rotating the flask as the solution is poured out slowly the entire inside of the flask is coated with the solution. The flask is then allowed to drain, inverted for 15 minutes. Then the membrane in the upper part of the neck of the flask is loosened by means of a knife blade. The inside of the flask containing the membrane is filled with water and then emptied to insure wetting the entire inner surface of the membrane, then water is poured between the membrane and the wall of the flask, loosening the membrane from the side of the flask as the flask fills. When the membrane has been loosened from the flask it can be easily pulled out; it must not be allowed to dry out. Immediately cut off that portion of the membrane which was inside the neck of the flask. Carefully open the membrane at the top so that a glass tube $^1/_2$ inch in diameter can be inserted for a distance of $^3/_4$ of an inch. Then the membrane is attached to this tube by wrapping around the tube a $^1/_2$ inch wide strip of adhesive tape. This should fit as tightly as possible. Then the membrane in the collapsed state is put in the dialysis bath and suspended in it by means of a clamp on the glass tube. The membrane is filled, through the glass tube, with water and lifted slightly so that 1.5 inches of the membrane are out of the water and exposed to the air. Then the exposed portion of the membrane as well as the strip of adhesive tape and the glass tube for a short distance are painted with a complete but thin coat of shellac. Any excess of shellac lying on the surface of the water of the dialysis bath is immediately skimmed off before it can harden. When the shellac is dried (about one hour is required for this), the exposed portions of the membrane, etc., are painted with a coat of the same Parlodion solution which was used in preparing the membrane. When this has dried the membrane is carefully emptied by removing it from the clamp and inverting it. This also serves to sweep the air out of the membrane as it collapses. It is then put back in the bath and the neoarsphenamine solution put in it. In our experiments 0.9 Gm. of neoarsphenamine was dissolved in 20 cc. of water. The atmosphere above the neoarsphenamine solution is cleared of air with a nitrogen stream using care to avoid breaking the membrane. Then a slight positive pressure of nitrogen is obtained by closing the glass tube with a one-hole stopper which is connected to a small gasometer. Before the membrane is expanded by the gas pressure it should be lifted by means of the clamp and glass tube to such a position that the surface of the neoarsphenamine solution inside the membrane is just below the surface of the water in the dialysis bath. The membrane containing the solution must then be lowered from time to time as the dialysis proceeds and causes it to increase in volume. Such an apparatus as this has been found to be entirely leak-proof and can be maintained under anærobic conditions. A sufficiently extensive dialysis of neoarsphenamine has been obtained by dialyzing in running water for 24 hours. The temperature of the water was maintained at 20° C. throughout.

When the dialysis has been completed the solution is transferred anærobically to a glass-stoppered cylinder. Any precipitate present is dissolved by means of sodium hydroxide. Then aliquot portions of this solution are used for arsenic and sulphur assays. The arsenic was determined by the Newbery (8) method and the sulphur by the method described by Elvove (5). The per cent of the total sulphur and arsenic remaining after dialysis can then be readily obtained by the following:

$$\frac{\text{Gm. Arsenic Undialyzed} \times 100}{\text{Gm. Total Arsenic Present}} = \% \text{ Arsenic Undialyzed}$$

$$\frac{\text{Gm. Sulphur Undialyzed} \times 100}{\text{Gm. Total Sulphur Present}} = \% \text{ Sulphur Undialyzed}$$

This method has been applied successfully to both neoarsphenamine and sulpharsphenamine and typical results are given in the table below. It is interesting

to note that at the end of 24 hours' dialysis there was a precipitate in the solution remaining in the dialysis bag in the case of neoarsphenamine, but none in the case of sulpharsphenamine. This precipitate was flocculent in character and was readily soluble in sodium hydroxide.

TABLE I.

Compound.	Total Arsenic Present—Mg. before Dialysis.	Total Sulphur Present—Mg. before Dialysis.	Undialyzed Material. Arsenic. Mg.	Arsenic. %	Sulphur. Mg.	Sulphur. %
Neoarsphenamine	178.2	56.4	111.0	66.3	10.4	18.5
Sulpharsphenamine	197.5	95.4	72.4	38.4	29.7	31.1

CONCLUSIONS.

1. These results show that neoarsphenamine has a larger undialyzable arsenic content than sulpharsphenamine.
2. It is also shown that the sulphur content of sulpharsphenamine is less readily removed by dialysis than that of neoarsphenamine.
3. In the course of the dialysis of neoarsphenamine a portion of the material remaining undialyzed precipitates in the dialysis bag. This is not true in the case of sulpharsphenamine.
4. The previous conclusion of a fundamental structural difference between neoarsphenamine and sulpharsphenamine is confirmed.

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THE POTASSIUM MERCURIC IODIDE REAGENTS FOR ALKALOIDS.

BY JANET TRAVELL, M.D.

A number of potassium mercuric iodide solutions have been recommended as precipitating reagents for alkaloids. Of these, Mayer's reagent is the most widely used and is regarded as an exceedingly sensitive qualitative solution for alkaloids in general. It was found, however, that this reagent would not detect codeine unless present in a concentration of at least 1 in 5000 parts, but that modification of the reagent rendered the reaction with codeine and other alkaloids much more delicate. These experiments show that Mayer's reagent, which is advocated as a qualitative test solution by the United States Pharmacopœia X and by textbooks generally, is probably the least sensitive of the potassium mercuric iodide reagents which have been described. It seemed worth while, therefore,

to review the literature in some detail, which I have found rather inaccessible, and to call attention to certain practical points concerning the use of these reagents, which may not be familiar to those not working constantly with them, or to whom the early literature is not available.

It is conceded that Winckler, court pharmacist at Zwingenberg (1), in 1830 prepared the first iodomercurate of an alkaloid (2). The introduction of the potassium mercuric iodide solutions as general qualitative reagents for the alkaloids is attributed to A. von Planta Reichenau (3), who in 1846 in a dissertation at Heidelberg gave them a prominent place among the alkaloidal reagents (4). After a lapse of several years, interest in this type of alkaloidal reagent reappeared in several parts of the world. Delfs (5) in 1854 observed that twelve non-volatile alkaloids were precipitated by his potassium iodomercurate solution, some even in high dilution, but he did not state the strength of his reagent. Nessler (6) in Germany in 1856 adapted the potassium mercuric iodide reagent as a qualitative test for ammonia in strongly alkaline solution, incidentally calling attention to its property of precipitating certain alkaloids in acid or slightly alkaline solution. de Vrij (7) in Holland in 1857 stated that 1/50,000 grain of strychnine could be detected if a drop of liquid were suspended in a capillary tube and a solution of the iodide of mercury and potassium added. Groves (8) in England in 1858 described the properties of a class of compounds, the bromo- and iodomercurates of the alkaloids, which he believed had escaped general attention. He did not directly describe the reagent which he used, but studied the properties and composition of the crystalline precipitates obtained with nine alkaloids.

Finally, in 1862 Valser (9) in Paris and Mayer (3) in New York published reports almost simultaneously on the use of potassium mercuric iodide solutions as general alkaloidal reagents. Valser alluded to de Vrij as the originator of the test, Mayer, to Groves. Valser's thesis, dated July 22nd, was the prize essay of the Société de Pharmacie (not a student dissertation) for the year 1862 (10). He advocated the use of a reagent which he prepared by saturating a 10 per cent (10:100) solution of potassium iodide with mercuric iodide to detect the presence of an alkaloid in an extract obtained by the method of Stas. He analyzed some of the alkaloidal precipitates and arrived at practically the same general formula for them as had Groves. He also used his reagent quantitatively to determine the molecular equivalents of certain alkaloids, and concluded that quinidine was an isomer and not a polymer of quinine. He noted that the presence of albumins and extracted principles might interfere with the results when the reagent was employed for the quantitative titration of alkaloids. Abstracts (11, 12, 13) of Valser's thesis promptly appeared in several journals in different countries, and it is difficult to understand why the Valser reagent received so little recognition except that none of these abstracts contained the exact formula for his reagent, and so far as I have been able to learn, his original paper was not printed in one of the scientific journals, nor did any further papers by Valser follow.

Mayer's (3) original paper on this subject was read at the annual meeting of the American Pharmaceutical Association in August 1862, and the next year an abstract (14) was published in the same number of the Proceedings as was a brief abstract (11) of Valser's thesis. Mayer claimed to have developed a new method for the volumetric estimation of alkaloids by means of titration with his potas-

sium mercuric iodide solution. Mayer's reagent is essentially a standard solution of potassium mercuric iodide in an excess of potassium iodide for quantitative use, which Mayer described as a tenth-normal solution of the iodohydrargyrate of potassium prepared by dissolving 13.55 Gm. of corrosive sublimate and 49.8 Gm. of potassium iodide in one liter of water. This was based on the equation (4):

$$HgCl + 3KI = KI.HgI + KI + KCl \text{ (Hg = 100)}.$$

The Pharmacopœia of the United States (15) directs essentially the same formula for the preparation of Mayer's reagent at the present time. Mayer unquestionably popularized the use of the potassium mercuric iodide solution for the quantitative determination of alkaloids, as his first article was followed almost at once by others (16, 17, 18) dealing with the details of the method, the determination of the alkaloidal molecular equivalents, the limits of sensitivity of the test, and the alkaloidal content of pharmaceutical preparations and vegetable extracts such as opium. Although the correctness of certain of the molecular equivalents obtained by Mayer has been confirmed by others (4), Mayer's method for the quantitative estimation of alkaloids had eventually to be abandoned because of the difficulty in fixing the end-point of the reaction. Nevertheless, the general use of Mayer's reagent for qualitative work has persisted up to the present time in spite of the availability of more sensitive types of potassium mercuric iodide reagents.

Regarding its usefulness for qualitative purposes, Mayer (16) found that distinct reactions were obtained with his reagent in solutions containing the following concentrations of various alkaloids (to quote from his paper): "atropia 1:7000, conia 1:8000, morphia 1:2500, narcotina 1:60,000, strychnia 1:150,000, brucia 1:50,000, nicotia 1:25,000, quinia 1:125,000, quinidia 1:50,000 and cinchonia 1:75,000." He stated that precipitates occurred in acid, neutral or slightly alkaline solution, apparently with equal sensitiveness. He reiterated that the presence of albumin did not interfere with the test: "Iodohydrargyrate of potassium, or a solution of corrosive sublimate in iodide of potassium, is not affected by tannin, albumen, . . . etc." (3), and "Iodohydrargyrates . . . differ from all other precipitants of the alkaloids, which as a rule do not allow the presence of starch, gum, albumen or tannic acids" (16). Mayer's observations were at fault in that he did not note that the reaction with some alkaloids, such as nicotine, is much less sensitive in slightly alkaline than in acid solution; he was not aware that albumin and other proteins yield precipitates with his reagent even in fairly low concentration; and he did not recognize that his reagent contained an excess of potassium iodide which rendered the alkaloidal precipitates soluble in an excess of the reagent.

In fact, a decade later, Tanret (19) utilized the precipitation of albumins by a potassium mercuric iodide solution for the quantitative estimation of albumin in urine. His reagent is still in vogue as a very delicate qualitative test for this class of compounds (20). Tanret was particular to note that although Valser had observed the precipitation of albumin by potassium mercuric iodide, he had not referred to the study of albumin in urine or elsewhere by means of his reagent (21).

Tanret, who must have had access to Valser's original article, also reinvestigated the subject of the qualitative use of potassium mercuric iodide reagents for

alkaloids (21). He noted that Mayer's solution contained an excess of potassium iodide, while in the reagents described by other authors there was a slight excess of mercuric iodide. He pointed out that the concentration of the potassium iodide solution from which the reagent was prepared affected the composition of the reagent. Thus in a solution saturated with potassium iodide, the double iodides which he depicted as $(HgI)_2KI$ and HgI.KI were formed, for under these conditions 3 mols of mercuric iodide required 2 mols of potassium iodide for solution; but owing to secondary decomposition of the salt $(HgI)_2KI$ a dilute solution ultimately contained only the iodide HgI.KI. He found that 10 Gm. potassium iodide in 10 per cent solution dissolved 14.73 Gm. mercuric iodide at 20° C., instead of the theoretical 13.68 Gm. required for the formation of the iodide HgI.KI, or the 21.44 Gm. of the iodide $(HgI)_2KI$ alone. He concluded, therefore, that the solution of potassium iodide directed in the preparation of Valser's reagent was sufficiently concentrated to retain in solution a certain amount of the compound $(HgI)_2KI$.

Tanret (21) compared the sensitiveness for various alkaloids of Mayer's and of Valser's reagents. His purpose in making this comparison is implied in his statement: "I observed that the iodohydrargyrates of the alkaloids are all more or less soluble in iodide of potassium, from which it must be concluded that the Mayer's solution which contains an excess of this latter salt is inferior to that of Valser." Alkaloids were tested both as the free base and as the salt, and the results obtained with both reagents were contrasted in a table which I have reproduced in part (Table I).

TABLE I.—RESULTS OF TANRET'S TESTS WITH MAYER'S AND VALSER'S REAGENTS.*

	Mayer's Solution.	Valser's Solution.
Atropine, base or salt	7,000	40,000
Cocaine, base or salt	60,000	240,000
Codeine, base	3,000	40,000
salt	8,000	40,000
Morphine, salt	2,000	10,000
Nicotine, base	1,200	160,000
salt	17,000	600,000
Pilocarpine, salt	9,400	60,000
Quinine, base	150	360,000
salt	180,000	480,000
Strychnine,[1] salt?	50,000	150,000

* The table indicated the number of parts of water in which the alkaloid might be dissolved and yet yield a distinct precipitate with the reagents.

[1] Added from the text of the article.

Tanret (21) also studied some of the properties of the alkaloidal precipitates, and mentioned several substances which might interfere with the reaction. He recommended that tests with Valser's reagent be carried out in neutral solution, and suggested that an alkaloid might be detected in the presence of albumin in acid solution by heating to boiling, filtering while hot and observing the reappearance of the alkaloidal precipitate in the cold.

Quite recently attention has been redirected by Munch, Crossley and Hartung (22) to the fact that Mayer's reagent is not the most delicate possible potassium

mercuric iodide reagent, that the sensitivity of successive lots may vary, and therefore they have suggested some modifications in its method of preparation to render it more sensitive. Fulton (23) in a classification of the reactions of 91 precipitating agents with alkaloids mentions four types of potassium mercuric iodide solutions which he terms "Mayer's reagent, concentrated Mayer's reagent, acid Mayer's reagent, and Mayer's and KI." All these reagents are prepared from mercuric iodide rather than from mercuric chloride which Mayer used, and the second one, prepared from 10 Gm. KI in 100 cc. water saturated with HgI_2 (about 15 Gm. required), very closely resembles Valser's reagent.

In spite of the marked superiority of Valser's over Mayer's reagent, which Tanret demonstrated so strikingly, none of the European Pharmacopœias, not even the French, recommend the use of Valser's reagent, and several of them (24) describe what is essentially Mayer's reagent as a qualitative test solution for alkaloids.

EXPERIMENTAL.

Reagents.—I. Mayer's reagent was prepared according to the directions in the United States Pharmacopœia X: mercuric chloride 1.358 Gm., potassium iodide 5.0 Gm., distilled water to make 100 cc., amounts nearly identical with those in Mayer's original formula.

II. Following a search of the literature with reference to the potassium mercuric iodide reagents, the general description of Valser's reagent was found (21). A reagent was then prepared by adding slowly from a burette a 10 per cent solution (W/V) of potassium iodide to a known weight of red mercuric iodide until the latter just dissolved. Under these conditions it was found that at 20° C., 10 Gm. of potassium iodide (U. S. P.) would dissolve almost exactly 14 Gm. of mercuric iodide (U. S. P.). This differs slightly from the figure, 14.73 Gm., obtained by Tanret; but 10 Gm. of the former salt would not accomplish the solution of 14.73 Gm. of the latter even when allowed to remain in contact with it for 24 hours, and after standing in contact with this excess of mercuric iodide, the solution contained free iodine. It is not clear from the references available by what method Valser's reagent was prepared. In any case, the reagent prepared by the method of titration, by which the complete solution of the mercuric iodide is just effected by the potassium iodide solution, and which proved to be in general the more delicate, will be referred to throughout this paper as the Valser reagent.

The Valser reagent is a clear, bright yellowish green, heavy liquid with a specific gravity of 1.1811 at 25° C. When cooled to a temperature of 4° C., red mercuric iodide does not separate out, nor is there any change in the appearance of the solution. The reagent does not contain free iodine, nor does any develop on standing. On diluting the reagent several times with distilled water, red mercuric iodide precipitates. No precipitate occurs when Mayer's reagent is similarly diluted. The Valser reagent does not decompose nor deteriorate with reference to its alkaloidal sensitivity when kept on a shelf in the light (not in direct sunlight) for at least three months, and probably longer.

A study was made of the relative sensitiveness of Mayer's and Valser's reagents for some of the commoner alkaloids in pure solution. Because of the marked solubility of the precipitates in an excess of Mayer's reagent, and in order to avoid undue dilution of the alkaloid, the conditions were arbitrarily fixed so that for each test 0.5 cc. of the reagent was added to 5 cc. of the alkaloidal solution. Tests were usually performed both in neutral and in acid solution; for the latter, dilutions of the alkaloid were made with tenth-normal sulphuric acid. It was noted that whereas the relatively concentrated solutions of the alkaloids yielded a definite precipitate with the reagents, in the more dilute solutions only a characteristic bluish fluorescence appeared, similar to that shown by pure solutions of quinine and quinidine. Slight degrees of fluorescence could be seen only when the test-tube was held against a background in a suitable light, and not by artificial light. Disappearance of fluorescence, rather than the absence of a precipitate, was considered as marking the limit of sensitivity. Because of the slowness with which fluorescence may develop when the alkaloid is present in low concentration, observations were made for about ten minutes.

The results of the comparison between the two reagents are shown in Table II. It was found that in the case of each of the nine alkaloids examined, Valser's reagent permits the detection of the alkaloid in much lower concentration than does Mayer's reagent. The relative sensitive-

TABLE II.—LIMITS OF SENSITIVITY OF MAYER'S AND VALSER'S REAGENTS.*

Alkaloid.	Lowest Concentration of the Alkaloid Which Can Be Detected by		Relative Sensitiveness of Valser's / Mayer's.
	Mayer's Reagent. One Part in	Valser's Reagent. One Part in	
Atropine sulphate	6,000	43,000	7.2
Cocaine hydrochloride	125,000	600,000	4.8
Codeine phosphate	5,500	43,000	7.8
Morphine sulphate	1,300	7,000	5.4
Nicotine	15,000	225,000	15.0
Pilocarpine hydrochloride	16,000	80,000	5.0
Quinidine sulphate	300,000	1,500,000	5.0
Quinine sulphate	300,000	1,500,000	5.0
Strychnine sulphate	100,000	500,000	5.0

* 5 cc. of the alkaloidal solution acidulated with sulphuric acid and 0.5 cc. of the reagent were used for each test, except in the case of pilocarpine and atropine which were tested in neutral solution.

ness of the former to the latter ranged from about 5 to nearly 8 times, with the exception of nicotine for which Valser's was approximately 15 times as sensitive as Mayer's reagent.

III. In order to test the effect of dilution of the reagent upon alkaloidal sensitivity, a third reagent, which we shall call the dilute Valser reagent, was prepared by the same method as employed for the Valser reagent, but using a one per cent solution of potassium iodide for titration of the mercuric iodide instead of a 10 per cent solution (W/V). Under these conditions, 10 Gm. of potassium iodide (U. S. P.) dissolves only 11.8 Gm. of mercuric iodide (U. S. P.) instead of 14.0 Gm. The dilute Valser reagent does not contain free iodine. On dilution with distilled water, mercuric iodide does not separate out.

A comparison was made of the sensitiveness for alkaloids of the dilute Valser reagent with that of the undiluted. It was found the ratio of sensitivity of one reagent to the other was not constant for the group of alkaloids named in Table II; thus the alkaloidal sensitivity of Valser's reagent ranged from 1.5 times that of the dilute reagent for quinidine to 6.5 times, for nicotine. The dilute reagent was in all instances more sensitive for these alkaloids than was Mayer's reagent.

Alkaloidal Iodomercurates.—The precipitates formed by Mayer's and Valser's reagent with the alkaloids listed in Table II are readily soluble in 10 per cent potassium iodide solution (W/V), dilute ethyl alcohol and tenth-normal sodium hydroxide. A concentration of alcohol as low as one or two per cent may diminish the sensitivity of the test. The precipitates are moderately or readily soluble in concentrated acetic and hydrochloric acids, but much less so in these acids when dilute. In dilute sulphuric acid the precipitates appear to be not at all soluble, except those of pilocarpine, which is quite soluble in this acid when as dilute as tenth normal, and of atropine, which is moderately soluble. The behavior of pilocarpine is peculiar among the alkaloids tested in that its iodomercurate is exceedingly soluble in dilute acetic, hydrochloric and sulphuric acids. All the precipitates of this group of alkaloids disappear on heating to boiling or in some instances at a temperature considerably lower than the boiling point.

Tanret noted that Mayer's and Valser's reagents yielded precipitates in much lower concentrations of certain of the alkaloidal salts than of the corresponding free bases. This observation was confirmed to some exent by the author, but the differences were not so striking as those obtained by Tanret. It was found that when nicotine base was dissolved in distilled water, the limit of sensitivity for Mayer's reagent was about 1:1300 and for Valser's reagent, 1:25,000; whereas in a solution of nicotine sulphate, prepared on the basis of the formula $C_{10}H_{14}N_2.H_2SO_4$, the limits were 1:3000 and 1:100,000, respectively. Solutions of quinine and strychnine bases, however, gave precipitates with both Mayer's and Valser's reagents in only slightly higher con-

centrations than did similar solutions of their salts. The lower sensitivity of the reagents with nicotine base, as compared with the salt, is probably due to the alkalinity of the solution.

Proteins.—The behavior of several proteins, namely, egg albumin, serum albumin, hemoglobin and gelatin, was studied with the various potassium mercuric iodide reagents described: Mayer's, Valser's and the dilute Valser's, the last two of which contain little or no excess of potassium iodide. In addition, tests were made with a reagent similar to Mayer's but containing a smaller excess of potassium iodide, prepared according to the formula: mercuric chloride 1.358 Gm., potassium iodide 3.422 Gm., distilled water to make 100 cc.

Colloidal solutions of the several proteins were prepared in distilled water. Precipitation in neutral solution did not occur with any of the potassium mercuric iodide reagents; precipitates appeared only in acidulated solution (sulphuric acid). In the case of each of the proteins, the limit of sensitivity was the same for all four reagents. The highest dilution of egg albumin which gave a positive result was approximately 1:70,000, of serum albumin, 1:15,000, of hemoglobin, 1:40,000 and of gelatin, 1:400,000.

The protein iodomercurates are difficultly, if at all, soluble in 10 per cent potassium iodide solution, or in ethyl alcohol, and they are intensified on heating, facts which serve to differentiate them sharply from the alkaloidal precipitates. The protein precipitates, like those of the alkaloids, dissolve readily on alkalinization with sodium hydroxide.

Tanret made the difference in the effect of heat on the alkaloidal and protein precipitates the basis of a method (described above) for the detection of an alkaloid in the presence of albumin. Although this method serves for alkaloids in moderately dilute solutions, it was found that the process of filtration necessary to remove the albuminoid precipitate markedly reduces the sensitiveness of the test for the alkaloid, probably owing to adsorption.

DISCUSSION.

There is a lack of agreement regarding the composition of aqueous solutions of potassium mercuric iodide. Briefly, it appears that a number of complex iodides may be formed upon the addition of a solution of potassium iodide to mercuric iodide or chloride. Five complex salts in all have been reported (25). On the basis of results obtained by a number of investigators, Dawson (26) concluded that when employing dilute solutions of potassium iodide in the preparation of these reagents, the tetraiodide, $2KI.HgI_2$, is the chief complex salt present, and that as the concentration of potassium iodide is raised and the relative proportion of mercuric iodide in the solution increases, this complex iodide is gradually transformed into one containing a relatively larger amount of mercuric iodide, either $3KI.2HgI_2$, or $KI.HgI_2$ together with equimolar quantities of $2KI.HgI_2$, probably the former. Exception to these conclusions has been taken by Dunningham (27) who calculated that in a 3-component system $KI–HgI_2–H_2O$ at 20° to 30° C., potassium mercuric triiodide, $KHgI_3$, and its hydrate, $KHgI_3.H_2O$, were the only complex iodides formed. Both potassium mercuric triiodide and tetraiodide have been prepared and their properties studied; the former is decomposed by water with precipitation of red mercuric iodide, while the latter is relatively stable (25). On treating mercuric chloride with potassium iodide as in Mayer's reagent, a complex iodide is first formed from which mercuric iodide rapidly separates owing to a secondary reaction with the mercuric chloride (28). The general conclusion is that aqueous solutions of mercuric iodide in potassium iodide contain the complexes $2KI.HgI_2$ and $3KI.2HgI_2$, and that under certain conditions, when using saturated or very concentrated solutions, potassium mercuric triiodide, $KI.HgI_2$, may also be formed.

Two factors in the main seem to influence the sensitivity of the potassium mercuric iodide reagents for alkaloids: the presence of an excess of potassium iodide

in which the precipitates are soluble, the nature of the complex iodide, which is determined by the relative amounts and concentration of the reacting salts, and probably by the temperature and a variety of other conditions which have not been adequately determined. The fact that on diluting the Valser reagent mercuric iodide precipitates out, whereas on dilution of the relatively dilute Valser reagent (Reagent III) no such precipitate is obtained, suggests the presence in the former of the triiodide, $KI.HgI_2$, and in the latter, of only the more stable tetraiodide, $2KI.HgI_2$. That the difference in sensitivity of the undiluted and dilute Valser reagents does not vary uniformly for the alkaloids tested, suggests further that these two complex salts behave differently toward these alkaloids, yielding alkaloidal iodomercurates with different solubilities.

Chemical analyses of the alkaloidal iodomercurates are comparatively rare. François and Blanc (29) prepared crystalline iodomercurates of eleven alkaloids. The majority of these contained one molecule of mercuric iodide in combination with one molecule of the iodohydrate of the alkaloid (HgI_2.Alkaloid.HI or 2HI), but three other types were described.

Certain differences obtain for the absolute limits of sensitivity of Mayer's and Valser's reagents for alkaloids as determined by Mayer, Tanret and myself. This is not surprising since it is certain that in 1863 Mayer was working with impure preparations of some of the alkaloids; Tanret likewise probably did not have specimens identical with those available at the present time. Furthermore, slight differences in the preparation of the reagents, especially in the relative amounts of potassium iodide and mercuric iodide, or chloride, cause considerable variation in sensitiveness. When using Mayer's reagent, the relative amounts of the alkaloidal solution and the reagent may also influence the results. The degree of acidity of the solutions constitutes another factor. In the present investigation, disappearance of fluorescence rather than absence of a precipitate was used as an end-point in determining the limits of sensitivity, whereas Tanret refers to a "distinct precipitate," a fact which would serve to explain possibly the higher limits of sensitivity obtained by the author with Valser's reagent, but not the lower limits for morphine and nicotine. Tanret, nevertheless, found that for the salts of seven alkaloids excluding nicotine, Valser's reagent was on the average 4.5 times as sensitive as Mayer's reagent, while the author determined the average ratio for the same alkaloids with the addition of quinidine to be 5.6 times.

The Valser reagent may prove useful for the quantitative estimation of small quantities of an alkaloid not in perfectly pure solution. It may also be possible to determine with relative ease any appreciable decomposition occurring in stock solutions of the alkaloids during a period of time. Thus, a solution of codeine sulphate did not alter in its behavior toward the reagent during a period of two months; a solution of morphine sulphate, on the contrary, became markedly more sensitive on standing. This would seem to indicate the decomposition or oxidation of the morphine into a compound or compounds detectable in higher dilution by the potassium mercuric iodide reagents than morphine itself.

For qualitative use the Valser reagent is to be preferred to Mayer's reagent, for the former yields a positive test in much lower concentrations of the alkaloids than does the latter, and possesses the added advantage that at the same time it is no more sensitive than is Mayer's reagent for certain protein impurities. Testing

with both these reagents provides an additional means of distinguishing between the iodomercurates of proteins and those of the alkaloids.

SUMMARY AND CONCLUSIONS.

1. A potassium mercuric iodide reagent, which closely resembles a reagent described by Valser, the exact formula for which was not available, was prepared by slowly adding a 10 per cent (W/V) solution of potassium iodide to red mercuric iodide until the mercuric iodide was just completely dissolved. Under these conditions, 10 Gm. of potassium iodide made up to 100 cc. in distilled water dissolves approximately 14.0 Gm. of mercuric iodide at 20° C.

2. The Valser reagent is much superior to the widely used Mayer's reagent as a qualitative test solution for alkaloids. For the nine alkaloids tested in pure solution, the former reagent was found to be from 4.8 to 15.0 times as sensitive as the latter.

3. The alkaloids investigated yielded a positive test with the Valser reagent in concentrations which ranged from approximately 1:7000 for morphine sulphate to 1:1,500,000 for the sulphates of quinine and quinidine.

4. Each of several proteins, which in low concentrations also form precipitates in the potassium mercuric iodide solutions, possesses virtually the same limit of sensitivity with all these reagents prepared regardless of their concentration or the presence of an excess of potassium iodide. Thus Valser's reagent was not more sensitive than Mayer's reagent for any of the proteins tested.

5. Attention is directed to the variability in the individual behavior of the alkaloids with solutions of potassium mercuric iodide. For example, the exceptional solubility of the iodomercurate of pilocarpine in dilute sulphuric acid (tenth normal) is pointed out, whereas the solubility of the iodomercurate of nicotine diminishes on acidulation with sulphuric acid.

6. Certain differences are noted between the properties of the iodomercurates of the alkaloids and those of the proteins investigated.

7. Factors which may influence the sensitivity of the potassium mercuric iodide reagents with alkaloids are discussed, and the literature regarding their use as precipitating reagents for alkaloids is reviewed.

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VEHICLES FOR MEDICINES.*

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VI. SYRUP OF CINNAMON.

Syrup of cinnamon has been recommended as an "almost specific" vehicle for salicylates. As the syrup of cinnamon has a brown color, its use would coincide

* From the Laboratory of Pharmacology, University of Illinois, College of Medicine, and assisted by a grant from the AMERICAN PHARMACEUTICAL ASSOCIATION.

with the idea expressed by Lucas and Henderson,[1] to use colored vehicles, such as syrup of glycyrrhiza or compound syrup of sarsaparilla, for salicylates in order to make the discoloration that salicylate undergoes on keeping, less obvious to the patients.

Dissolving 0.30 Gm. of sodium salicylate in 4 cc. of syrup of cinnamon yields a preparation that is disappointedly disagreeable to our taste. As the syrup of cinnamon itself has an astringent and somewhat acrid taste, the disagreeableness may be due to the tannin and cinnamic acid present in the cinnamon, for the syrup is prepared by extraction of the cinnamon with alcohol (almost 10%) in cinnamon water. We have noticed that the presence of even a small quantity of acid brings on an acridity in salicylate solutions, presumably due to liberation of salicylate ions.

Inasmuch as this syrup is merely intended as a flavoring vehicle, it may well be questioned why we should make this preparation from the drug itself, and include various undesirable, because disagreeably tasting, ingredients, when the oil of cinnamon represents the cinnamon flavor so fully.

EXPERIMENTS ON FLAVORING A SYRUP.

We therefore set about to experiment on the question of preparing a syrup directly from the oil itself, starting with cinnamon water, and using it in the percolation of the sugar. (*Process 1.*)

Cinnamon Water	450.0 cc.
Sucrose	850.0 Gm.

Percolate until 1000 cc. of the syrup are obtained. This results in a clear, rather mildly cinnamon-flavored syrup.

With the hope of increasing the strength of the preparation and saving the clarification of the cinnamon water by filtration through absorbent material, we shook up oil of cassia with water and percolated the sugar with this mixture. (*Process 2.*)

Oil of Cassia	1.0 cc.
Distilled Water	450.0 cc.
Mix by vigorous agitation and percolate through Sucrose	850.0 Gm.

until 1000 cc. of the syrup are obtained.

The resulting syrup is slightly opalescent, but practically clear, and of stronger flavor than that resulting from Process 1, and of pleasantly burning taste.

To determine whether we might introduce a still larger quantity of cinnamon oil into the syrup by better subdivision of the oil of cassia, we triturated the sugar with the volatile oil and percolated with water. (*Process 3.*)

Oil of Cassia	1.0 cc.
Sucrose	850.0 Gm.
Triturate thoroughly and percolate with Distilled Water	450.0 cc.

until 1000 cc. of the syrup are obtained.

This yielded a decidedly turbid fluid of rather strong cinnamon flavor and taste. By reducing the oil of cassia to one-fourth the amount that is employed in the preparation of cinnamon water and distributing this oil over sucrose, we secured a preparation practically identical in appearance, odor and taste with that yielded by Process 2. It is obvious, therefore, that Process 3 is more economical in

[1] *Canadian Medical Journal*, April 1931

the use of the oil of cassia than are any of the previously enumerated processes, obviously because of the presenting of a larger surface of the volatile oil to the solvent than in the other methods.

In an attempt to possibly still further increase the cinnamon content of the preparation—though this seems hardly necessary—we dissolved the oil of cassia in a small proportion (5%) of alcohol and distributed the alcoholic solution over the sugar which was then submitted to percolation with water in the preparation of the syrup. (*Process 4.*)

Oil of Cassia	1.0 cc.
Alcohol	50.0 cc.
Triturate this thoroughly with Sucrose	850.0 Gm.

Then percolate with Distilled Water until 1000 cc. of the syrup are obtained.

The result is surprising in that odor as well as taste are less prominent than in the syrups resulting in Processes 2 and 3.

In view of the above-stated facts, it is an interesting question as to what happens to the oil of cassia used in the various processes. In Process 1, in which cinnamon water was employed, the large excess of oil that was used was filtered out, being left in the absorbent material. In Process 2, in which the oil was shaken with the water, crude oil droplets were found on the walls of the funnel and on the cotton plug as could be clearly demonstrated by means of Sudan III. Process 3 secures better subdivision and distribution and therefore enables one to obtain identical results with those of Process 2 with the use of a smaller proportion of oil. In Process 4, there can be no doubt that a larger proportion of oil is in solution, for we are dealing with a better solvent and there certainly must be less loss of oil than in any of the previous processes, and yet the product appears to our senses decidedly weaker. The answer as to the reason for this remarkable discrepancy in results is probably to be found in the physical fact that a substance will not exchange a good solvent for a poor solvent. Hence, the oil of cassia is "disguised" better, *i. e.*, less prominent to odor and taste than it would be were it to find itself in supersaturated solution in a poorer solvent.

We, therefore, recommend consideration of the following formula for the syrup of cinnamon of the forthcoming National Formulary.

SYRUPUS CINNAMOMI.

Syrup of Cinnamon.

Syr. Cinnam.

Oil of Cassia	**0.5 cc.**
Compound Tincture of Cudbear	**60.0 cc.**
Sucrose	**850.0 Gm.**
Water, a sufficient quantity To make	**1000.0 cc.**

Distribute the oil of cassia over the sucrose by trituration in a mortar, and percolate with 390 cc. of water to which the compound tincture of cudbear has been previously added. Percolate until 1000 cc. of syrup are obtained.

PRESCRIPTION FOR SALICYLATE.

When we use the syrup thus prepared as a vehicle for salicylate with the addition of alkali, there is possibly a diminution of the cinnamon flavor of the syrup

by the addition of the just sufficient quantity of water to dissolve the salicylate and the alkali which should guard the salicylate against precipitation in the form of salicylic acid by the acid of the gastric juice. The following prescription might, therefore, be recommended: potassium bicarbonate having been chosen in preference over sodium bicarbonate because of its greater solubility in water.

℞	Sodium Salicylate	10.0 Gm.
	Potassium Bicarbonate	10.0 Gm.
	Cinnamon Water	60.0 cc.
	Syrup of Cinnamon, enough to make	120.0 cc.

Mix and label: Teaspoonful in glassful of seltzer water every two hours.

One advantage of using the cinnamon syrup instead of colorless syrups is that the discoloration salicylate undergoes on standing is thereby rendered unnoticeable.

IRON IN CINNAMON SYRUP.

Another advantage of our synthetic formula for syrup of cinnamon is that it could be used as a vehicle for iron salts, while the syrup at present official in the N. F. is out of the question for this purpose, because of "ink" formation. The following formula yields an actually delicious clear preparation.

℞	Iron and Ammonium Citrate	10.0 Gm.
	Water	10.0 cc.
	Syrup of Cinnamon (made from Oil of Cassia) to make	120.0 cc.

Mix and label: Teaspoonful in water three times a day after meals.

This would yield the average medicinal dose per teaspoonful. In view, however, of the much larger doses favored by clinicians, a tablespoonful, which might carry 1.5 Gm. of the medicament, would be more likely to produce striking results.

DRUG STORE LOCATION.*

BY I. K. ROLPH.[1]

Perhaps no kind of retail business is more sensitive to good or faulty location than the drug store. This is largely because the drug store, more than any other kind of store with a city-wide distribution, enters into competition with a great many other kinds of stores and because it is dependent, to varying degrees, upon both transient and resident patronage.

TYPES OF LOCATIONS DEFINED.

There may be said to be five different types of retail locations, irrespective of kind of business. These five types of locations, each with its own definite characteristics, are: Central shopping district location, sub-center location, neighborhood location, string-street location and the "not concentrated" location. It is obvious that these location types are in relation to the retail structure of a city and, for that reason, are applicable to any large city. (Figure 1.) Further, because of

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* Section on Commercial Interests, A. PH. A., Washington meeting, 1934.

[1] Research Specialist, Bureau of Foreign and Domestic Commerce.

the diffused distribution of drug stores, we find drug stores represented at every one of these locations. (Table I.)

TABLE I.—THE RETAIL DRUG PATTERN.

Locations.	ST. LOUIS. Per Cent of Drug Stores Represented.	ST. LOUIS. Per Cent of Drug Sales Represented.	ST. LOUIS. Average Annual Sales per Store.	BALTIMORE. Per Cent of Drug Stores Represented.	BALTIMORE. Per Cent of Drug Sales Represented.	BALTIMORE. Average Annual Sales per Store.
Total	100.0	100.0	$ 30,252	100.0	100.0	$ 30,000
Central shopping district	3.5	15.0	127,346	5.0	24.1	143,000
Uptown shopping district	1.6	4.8	88,338			
Sub-centers	20.4	26.6	39,558	18.3	24.7	40,500
String streets	13.3	10.3	23,466	7.4	7.8	32,000
Neighborhood developments and not concentrated	61.2	43.3	21,585	69.3	43.4	19,500

The central shopping district location is obviously within a city's central shopping district—the heart of the business district. The tendency in every city, outside of the heart of it, is for the population to group itself into communities. Some communities are, of course, more clearly defined than others. Sub-centers are the business centers of these urban communities. As a city may be said to be composed of a number of communities, so each community may be said to be composed of a number of neighborhoods. And neighborhood business reflects that part of the community in which it is located, and is governed, to an even greater degree, by the same considerations that govern the sub-center. String-street locations are those business sites strung along a street, on one or both sides, for a considerable distance. Business is not a definite part of the community around it, but rather draws its patronage from those persons using the street. "Not concentrated" business is that business which is scattered without relation to any retail development. It is business which stands alone, and may occur in any part of the city.

TABLE II.—THE CENTRAL SHOPPING DISTRICT IN THREE METROPOLITAN COMMUNITIES.

	BALTIMORE.	PITTSBURGH.	ST. LOUIS.
Area of district in square miles	0.14	0.21	0.15
Per cent of city's stores represented	6.10	11.00	5.60
Per cent of city's sales represented	28.10	47.00	32.00
Average annual sales per store	$143,190	$210,000	$249,000
Per cent of sales done in this district by:			
General merchandise stores	38.0	49.0	51.0
Apparel stores	19.5	14.0	18.0
Furniture and household stores	9.5	11.0	11.0
Jewelry stores	4.3	3.0	3.0
Automotive establishments	0.3	1.0	1.0
Restaurants and other eating places	4.2	4.0	4.0
Lumber and building establishments	2.9	1.0	0.3
Food stores	2.4	7.0	1.0
Drug stores	2.9	2.0	1.7
Other retail stores	16.0	8.0	9.0
Per cent of sales done in this district by:			
Independent stores	64.1	59.0	72.0
Local chains	3.5	4.0	2.0
Sectional chains	15.7	10.0	4.0
National chains	10.9	26.0	19.0
Other types	5.8	1.0	3.0

THE CENTRAL SHOPPING DISTRICT LOCATION.

The proportion of a city's drug store business done at central shopping district locations is between 15 and 25 per cent, if St. Louis and Baltimore can be considered fairly typical of a metropolitan community. And these amounts of business are carried by about 4 or 5 per cent of the total drug stores in the city. (Table I.) In relation to central shopping district business as a whole, drug stores do from 1.7 per cent to 2.9 per cent of all business in that district. (Table II.)

Since business in this district is entirely dependent upon transient patronage, accessibility is the chief consideration in choosing a site. If accessibility is the chief consideration, then the amount of traffic that passes a location is important. In connection with the National Drug Store Survey conducted in St. Louis, the amount of traffic passing eight drug stores in the central shopping district was analyzed and compared with the net sales of these same stores. By correlating this information with the rent paid, it was possible to determine the cost of rent for every 100 persons passing each site and the average sales derived from every 100 passersby.

This analysis showed that these eight drug stores paid in rent all the way from 12 cents to 38 cents for every 100 persons that passed, and made sales of from $1.53

TABLE III.—AN ANALYSIS OF EIGHT ACTUAL DRUG STORE SITES (ST. LOUIS).

Site Number.	Average Day's Traffic.	Per Cent Rating on Basis of Traffic Flow.	Sales Derived from Every 100 Persons Passing Store. (Relation of Traffic to Sales.)	Rent Cost for Every 100 Persons Passing Store. (Relation of Traffic to Rent.)	Per Cent Relation of Rent to Net Sales.
1	37,000	100.00	$2.95	$0.38	12.7
2	32,500	87.84	2.62	0.12	13.1
3	30,000	81.08	3.38	0.28	8.4
4	22,000	59.46	2.15	0.31	4.7
5	21,000	56.76	3.94	0.33	16.6
6	20,000	54.05	1.53	0.25	14.7
7	17,500	47.29	4.59	0.24	5.2
8	11,000	27.73	2.31	0.30	8.2

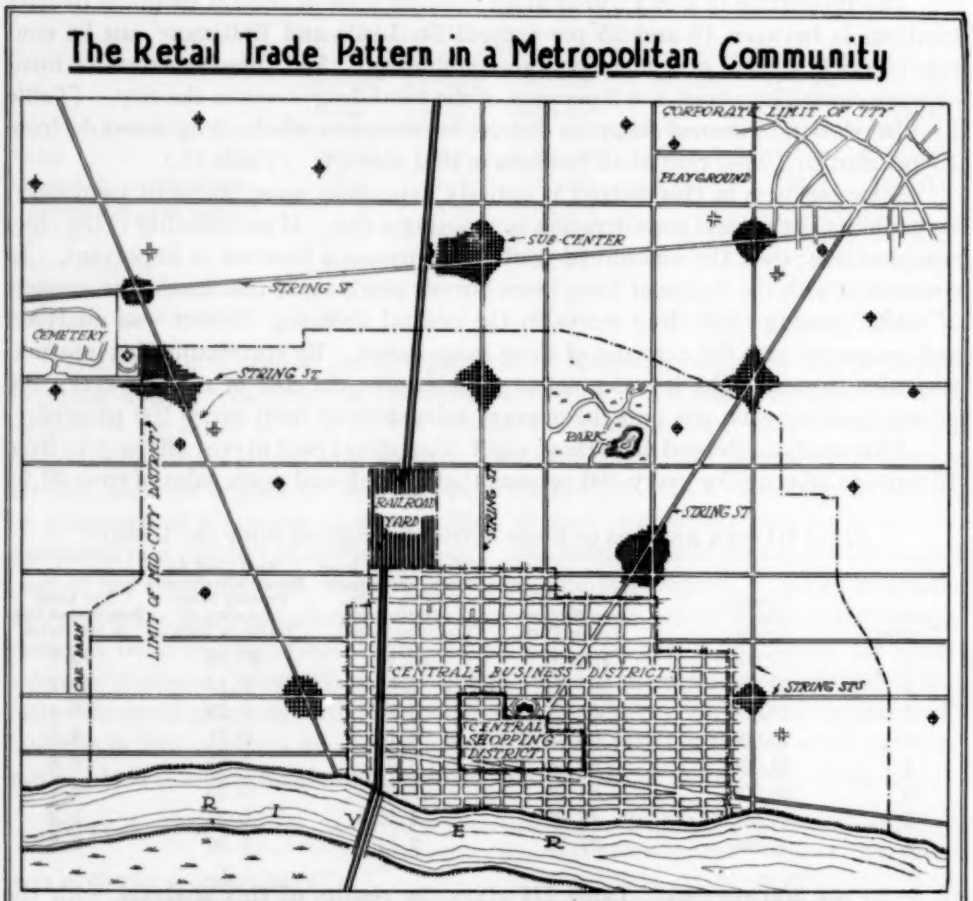
to $4.59 per 100 persons. Table III gives the results of this analysis, with the sites arranged in the order of the volume of the average day's traffic.

It may be seen that at those points where traffic is heaviest, traffic is not always of the greatest value. In fact, the second lowest amount of daily traffic (17,500 persons) shows the greatest sales per 100 persons, and at a rent cost of only 24 cents per 100 persons passing.

It is thus indicated that not only is traffic as such an unreliable measure of potential business unless related to the character of traffic, but that rent is also an unstable factor, frequently unrelated to the value of the traffic or the actual amount of business which such a site can produce.

In connection with drug store rentals at central shopping district locations, you may be interested in learning about other drug store operating costs at these same locations contrasted with drug store operating costs at all other locations in the city. Such a study has just been made in the Bureau of Foreign and Domestic Commerce. It was based upon the Census of Retail Distribution, taken in St. Louis, although it is not a part of the National Drug Store Survey.

Salaries paid employees amounted to 12.2 per cent of sales in central shopping district drug stores, and 12.4 per cent of sales in drug stores located elsewhere



Types of Retail Business Development & Factors Determining their Growth

Factors of Influence	Central Shopping District	Sub-Centers (Mid-city)	Sub-Centers (Outlying)	String Streets (Mid-city)	String Streets (Outlying)	Neighborhood Groups (Mid-city)	Neighborhood Groups (Outlying)	Mid-Concentrated Locations (Mid-city)	Mid-Concentrated Locations (Outlying)
Resident Population Density	Very Low	High	Medium	High	Medium	High	Low or Med.	High	Low or Med.
Patronage	City's Trading Area	Local & Transient	Mainly Local	Either Mainly Local or Mainly Transient		Local		Mainly Transient	
Income of Patronage	Income of Trade Area	Med.-Low	Med. to High	Low, or Med., or High		Very Low to High		Low to High	
Racial Composition of Patronage	Race Distinctions Subdued or Absent	White, or Foreign, or Negro	Usually the Same White Group	White, or Foreign, or Negro		White, or Foreign, or Negro		White, or Foreign, or Negro	
Transportation Facilities	Center of all Facilities	Important Local Street Car Intersection	Important Local Street Car Intersection	Main Thoroughfare for Auto, or Bus, and Street Car Traffic		Usually None	Usually None	Usually a Main Thoroughfare for Auto Traffic	
Trade Barriers	Usually None	Usually None	May be One or More	Usually None	May be One or More	Usually None	May be One or More	Usually None	May be One or More

Fig. 1.—A typical urban community showing examples of its retail business developments together with a list of factors determining their character and growth.

in the city. Actual rent amounted to 7.1 per cent of sales in central shopping district drug stores, and 5.9 per cent of sales in stores elsewhere. Other expenses amounted to 5.4 per cent of sales in central shopping district drug stores, and 5.6 per cent of sales in stores elsewhere. Including a wage-compensation to owners (the average salary paid to employees and imputed to all owners who were reported as working in their stores), the total operating expense amounted to 24.8 per cent of sales for drug stores at central shopping district locations and 26.7 per cent of sales for drug stores at locations elsewhere in the city.

It is interesting to know that 70 kinds of retail business were found to have locations both in the central shopping district and outside. Of these 70 kinds of business, 37 were found to have lower total operating-expense ratios when located in the central shopping district than when those same kinds of business were located outside. The remaining 33 businesses had, of course, higher total operating expenses when located in the central shopping district than when located outside. The drug store is one of the 37 businesses whose total operating-expense ratio is lower (to the extent of 2 points) at central shopping district locations. However, it is well to remember that the expense ratio for stores outside of the central shopping district represents an average ratio for all stores at four types of locations (the sub-center, the neighborhood, the string-street and the not-concentrated locations), while the central shopping district ratio is for stores at one type of location only, namely, the central shopping district location.

Continuing with an analysis of expense ratios in the central shopping district, the above-average-sales stores were separated from the below-average-sales stores. The average sales per drug store in the central shopping district were found to be $127,346, and six stores were found to have sales above that amount and 15 stores were found to have sales below. The total operating-expense ratio for those six stores with above-average sales was found to be 22.9 per cent, and the ratio for the 15 stores with below-average sales was found to be 28.8 per cent—a 6 point difference. To quote from this study—"The drug store reacts more consistently than any other kind of business in feeling the effect of increased sales. Actual-rent, employee-salary and other-expense ratios vary in similar degrees, as sales go above or below average, resulting in the same consistent differences in total operating-expense ratios." Perhaps I should state that while the average sales for all drug stores in the central shopping district were $127,346, the average sales for those stores with above-average sales were $303,541, and the average sales for those stores with below-average sales were $56,868.

THE SUB-CENTER LOCATION.

The second most important type of drug site is the sub-center location. If the two cities (Baltimore and St. Louis) constitute an adequate sample, so that between 4 and 5 per cent of a city's drug stores are in the central shopping district, it is probably true that about 20 per cent of the drug stores are located in sub-centers. (Table I.) And it is undoubtedly the second ranking location type for a drug store, from the point of view of volume of business. Volume depends further, however, upon the income area in which the sub-center is located.

Accessibility to the people of that community, which is largely determined by transportation facilities, is, of course, as much of a factor in sub-center location as

accessibility to the city as a whole is in central shopping district location. And accessibility appears to be more correctly expressed in rent as related to sales at these locations than at central shopping district locations. An analysis of rent-to-sales percentages at a considerable number of sub-center locations has revealed, generally, a small range due largely to the fact that actual value of these locations is an easier matter of judgment. The survey in St. Louis showed that the rent-to-sales percentages at sub-center locations there were almost 4 points lower than at central shopping district locations. And those 4 points may be a contribution to net profit.

A higher selectivity of locations is available, also, when selecting a sub-center site, for there are always many sub-centers in any one city, as against only one central shopping district. Further, since sub-centers reflect very closely the income of the communities in which they are located, the volume of business one aims to do can be more closely related to a sub-center site than to any other type of site. Also, the kind of people one wishes to serve, which is expressed in racial background and occupations as well as income, determining the kind and quality of stock to be carried, may frequently be selected at sub-center sites. The population density of a community determines, in part, the stock turnover and volume.

THE NEIGHBORHOOD LOCATION.

Closely related to sub-center location is neighborhood location. Neighborhood drug business reflects the income of the people living in those neighborhoods to the same degree that sub-center drug business reflects the income of the people living in sub-center communities, which, after all, are simply the larger units of which the neighborhoods are part.

There is even a higher selectivity of locations available among neighborhood sites. And because it is a small part of a larger unit, a store at such a site is almost entirely dependent on the people immediately surrounding it. While stores here do not offer such high volumes (the average is probably about $20,000, as shown in Table I), they can be very profitable if they are located in the right neighborhoods.

The St. Louis survey found that the rent-to-sales percentages at neighborhood locations were higher than at sub-center locations. Actual rentals were not higher but apparently they were out of proportion to the volume of business possible at those locations. In some instances, it has been known that landlords take advantage of the possibility that the neighborhood may become a sub-center later on, and so charge accordingly. It is believed better to pay a rental based on to-day's volume and a higher rental as the district develops rather than to speculate on the future of a district and pay on that basis. The landlord rather than the merchant should do the speculating.

THE STRING-STREET AND NOT-CONCENTRATED LOCATIONS.

The opportunities for drug store business are less at string-street and not-concentrated locations than at any other location types. (Table I.) Their chief weakness is due to the fact that they lack a business focal point, and so are difficult locations at which to carry on a drug business. Instances of considerable success are few and are accomplished only by exerting more than ordinary effort. Usually

these locations cater only to a small and limited number of drug patrons and fill emergency needs rather than general drug needs.

SUMMARY.

The possibilities of drug business at locations outside the central shopping district may be said to be in this order: Sub-center, neighborhood development, string-street development and the "not concentrated."

In choosing a central shopping district location, it should be borne in mind that the drug business at these locations accounts for less than one-fourth of all the drug business within the city limits, that character as well as amount of traffic should be considered in appraising a site's accessibility, and that rent also should be related as closely as possible to the actual amount of business which such a site can produce.

From an accumulation of figures, over a period of time and in a number of cities, it appears that drug stores located in sub-centers have the most desirable operating figures and characteristics. Sub-centers, generally, provide a high selectivity of profitable drug locations.

Both the sub-center and neighborhood locations are greatly influenced by the income of the population around them. The string-street location is greatly influenced by the character of traffic that uses the street and the degree and kind of business specialization that may exist there.

In general, five factors determine the selection of any profitable drug store location. *First*, it must be accessible to a sufficient number of people, either transient or resident patronage, or both. Resident patronage can be estimated by knowing the population of the shopping area to be served. If it is transient patronage, either partly or wholly, it is necessary to be assured of accessibility by street car, bus or automobile. *Second*, the people within that shopping area must have sufficient purchasing power. *Third*, if the racial composition or background of the people is conspicuous, it should be known so as to determine the kind and quality of stock to be carried. In the case of a chain store, the selection of a manager may even be influenced by such knowledge. *Fourth*, it is necessary to know the availability of transportation facilities, in all cases except where the patronage lives immediately around the store, as at the neighborhood location. And transportation facilities may be misleading unless the character of traffic is considered along with number of persons. A *fifth* factor is topography or other trade barriers (natural or artificial), which in residential areas, particularly, affect the limits of a shopping district. It is believed that these five factors can be more correctly applied if thought of in terms of the structure of the entire city.

ELECTIONS OF NATIONAL ACADEMY OF SCIENCES.

At the meeting of the National Academy of Sciences held in Washington on April 23rd, 24th and 25th, Dr. Thomas Hunt Morgan, director of the William G. Kerckhoff Laboratories of the Biological Sciences of the California Institute of Technology and past-president of the academy, was elected foreign secretary to succeed Dr. Robert A. Millikan, director of the Norman Bridge Laboratory of Physics and chairman of the Executive Council of the California Institute of Technology, who asked to be relieved of the office, which he has held for the past fifteen years. Dr. Roger Adams, professor of organic chemistry at the University of Illinois, and Dr. H. S. Jennings, professor of zoölogy at the Johns Hopkins University, were elected members of the council.—*Science*, May 4, 1934.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

C. B. JORDAN—CHAIRMAN OF EXECUTIVE COMMITTEE, A. A. C. P., EDITOR OF THIS DEPARTMENT.

Editor's Note: Recently a state board member complained to me because as he said "No matter how simple a question I may ask about products of the National Formulary, I find that graduates have difficulty in answering it." We must recognize the fact brought out so well by Dr. W. J. Husa in the paper which follows, that the National Formulary is coming into use more and more and therefore we must see to it that our students are familiar with it and appreciate its value in the conduct of their drug stores. Dr. Husa's paper is timely and practical.—C. B. JORDAN, *Editor*.

THE NECESSITY FOR INCREASING EMPHASIS ON THE N. F. IN PHARMACY COURSES.

BY WILLIAM J. HUSA.*

In pharmaceutical education, the United States Pharmacopœia has traditionally received greater emphasis than has been accorded to the National Formulary. Forty years ago, the U. S. P., with its prestige based on seven decades of useful service, must have towered above the embryonic N. F. in the minds of pharmacists. However, with the passing of the years, the N. F. increasingly justified its existence, and in 1906 the Federal Food and Drugs Act made it a legal standard, thus placing it on a par with the U. S. P. in legal standing.

In any comparison of the U. S. P. and N. F. it is necessary to consider the fundamental distinction between the two books, which is that the U. S. P. admits drugs on the basis of therapeutic usefulness, and aims to keep at a minimum the pharmaceutical preparations of these drugs, while the N. F. is essentially a book of pharmaceutical formulas, selected on the basis of their use by physicians but with no indorsement of their therapeutic worth, this being left to the judgment of the individual physician.

As pharmaceutical educators, it is worth our while to consider where the difference in scope between the U. S. P. and N. F. is leading us, and to give thought to other developments which seem to call for a revision of the content of our pharmacy courses.

The changes which have been taking place with successive revisions of the U. S. P. are reflected in the statement of a prominent retail pharmacist, who said that in his earlier experience, four or five copies of each revision of the U. S. P. were worn out by use in his store, while more recently one copy has lasted more than ten years. On the other hand, in recent years, many pharmacists have been saying that they use the N. F. a great deal more than the U. S. P. We see here a definite trend which merits the thoughtful attention of every teacher of pharmacy.

The reasons for the fact that many retail pharmacists are using the N. F. more than the U. S. P. are not far to seek. In the first place, by steadily pursuing the declared policy of keeping pharmaceutical preparations at a minimum, the U. S. P. is becoming more and more a book of standards for individual drugs, and is thus

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naturally of more direct usefulness to manufacturers and enforcement officials than to retailers. Furthermore the complexion of the list of drugs is changing, with the inclusion of increasing numbers of synthetics and biologicals, which require less compounding on the part of the pharmacist, so that there is less frequent necessity for referring to the U. S. P. Then there is the spirit of therapeutic nihilism driving many drugs and preparations from the U. S. P., it being easier to superciliously throw a drug overboard than to study out the exact conditions of successful use which led to its reputation. Some authorities think that too much emphasis has been placed on pharmacological methods in matters of deletion of drugs. For example, it may not be possible to demonstrate the effect of an antipyretic on a dog of normal temperature. The fact that a drug has been found useful by generations of practicing physicians should carry due weight. Let us remember that chaulmoogra oil was used for leprosy for centuries before its value was demonstrated in a scientific way, and that burnt sponge, which contains iodides from sea water, was used in cases of goiter for a thousand years before iodine was recognized as an element. Cod Liver Oil was used empirically for generations before vitamins were discovered, meanwhile bearing the brunt of much criticism to the effect that it was no better than other fats.

With these changes in the U. S. P. the types of preparations which can be made by the pharmacist have been shifting to the N. F. For example, there are two elixirs in the U. S. P. and 65 elixirs in the N. F.; there are 3 emulsions in the U. S. P. and 5 in the N. F.; of fluidextracts, we find 26 in the U. S. P. and 104 in the N. F.; of liniments there are 5 in the U. S. P. and 10 in the N. F.; of solutions there are 23 in the U. S. P. and 37 in the N. F.; of mixtures there are 2 in the U. S. P. and 13 in the N. F.; of ointments there are 18 in the U. S. P. and 19 in the N. F.; of syrups there are 18 in the U. S. P. and 37 in the N. F.; of tinctures there are 40 in the U. S. P. and 55 in the N. F.; etc. The N. F. also contains many other types of preparations such as petroxolins, sprays, mulls, oleates, dermatologic pastes, dental preparations, veterinary preparations, etc. The presence of the various preparations in the N. F. is based on extensive surveys showing the extent of use of all items by physicians of the U. S. The group of N. F. preparations might thus be thought of as an All American selection, chosen by the physicians of the nation, the vote being the truest possible one, that of actual use.

It is thus easy to understand the increasing use of the N. F. by pharmacists. In bringing N. F. preparations to the attention of his local physicians, the pharmacist is thus making available to them the preparations found most useful by physicians of the U. S.

However, the policy of basing admission to the N. F. on the extent of use has a very serious drawback. According to a line of reasoning now popular in pharmaceutical circles, when Edison was about to construct the first electric light plant, he should have made a survey of the country, which would have shown that there were no electric light plants in use, therefore he should have concluded that he should not start one.

There should be a place in the N. F. for new preparations which should be introduced, featured and used in the same manner that new proprietaries or specialties are launched, otherwise the N. F. will stagnate. Research should be sponsored on new preparations, new combinations incorporating modern scientific

medical ideas. These products should be subjected to thorough pharmacological and clinical tests.

Although the N. F. does not take the responsibility of indorsing the therapeutic value of its items, this policy should not deter the pharmacist from detailing the physicians with N. F. preparations, since we need only recall that the N. F. contains preparations of such drugs as the cinchona alkaloids, the bromides, strychnine, cod liver oil, cascara sagrada, iron, salicylates, senna, belladonna, santonin, ipecac, opium, digitalis, calomel and many other preparations containing drugs of unquestioned therapeutic value presented in combinations which have been found useful by physicians.

The increasing use of the N. F. by pharmacists makes it necessary that we place increasing emphasis on the N. F. in our pharmacy courses. Our conference here to-day gives us the opportunity of exchanging ideas regarding methods of teaching and content of courses which will place proper emphasis on the N. F. Our teaching could well be aimed to inspire some constructive thought on the part of the students, so that they will view the N. F. as a living, growing project which is theirs to use and to develop to an ever-increasing extent in the upbuilding of the profession of pharmacy in its service to humanity.

EXTRACTS FROM THE SUMMARY OF PROCEEDINGS OF THE 1934 MEETING OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY.

The 35th annual meeting of the American Association of Colleges of Pharmacy was held May 7th and 8th. Eighty-six delegates from forty-four member colleges were in attendance.

Dean Theodore J. Bradley presented a memorial on the death of Prof. Florin J. Amrhein.

The address of President L. D. Havenhill is printed in the May number on pages 462 to 470.

Secretary-Treasurer Zada M. Cooper reported a membership of fifty-seven colleges with one in arrears for dues. A second series of visits to member colleges was completed early in the year.

Cash on hand amounted to $1233.58. The report was accepted and an Auditing Committee appointed.

Chairman C. B. Jordan, of the Executive Committee, submitted the following relative to fifty-five colleges reporting: The total number of entrants for 1933–1934 was 1902; the number of High School graduates, 1894; the number of special students, 8; the number that had previous college training, 500. This report shows an increase of 7% over that of 1932 to 1933; the number of students having previous college training increased 3%; the total by 26.3% of all entering students.

The report contained the following recommendations, which were adopted:

(1) That a committee of three be appointed to coöperate with similar committees of the N. A. B. P. and the A. Ph. A. to assist in straightening out code matters.

(2) That credits earned in a standard college, one recognized by the state educational department or by the state university in which it is located, may be accepted for face value in a college of pharmacy in so far as such work applies in the course in pharmacy, but, regardless of amount of credit offered, no student will be permitted to complete the course in pharmacy in less than two collegiate years. This recommendation was made a part of Paragraph 3 of Article VII of the by-laws.

(3) That the Association request the American Council on Pharmaceutical Education to proceed without further delay to perform the functions for which it was created and that the secretary inform the President of the American Council on Pharmaceutical Education of this request.

(4) The American Association of Colleges of Pharmacy is vitally interested in any attempt to improve the control of the sale and the advertisement of food, drugs and cosmetics, and it goes on record as highly in favor of legislation that will properly protect the public against the advertisement or sale of fraudulent, misrepresented, poisonous or deleterious food, drugs or cosmetics.

(5) That this Association goes on record as favoring Amended Senate Bill 2800 as reported by the Senate Committee on Commerce on March 15, 1934, or a bill of equal or greater merit.

A resolution, relative to ideal qualifications for deans, which had been referred to the Executive Committee was considered and the following recommendation made and adopted:

That the Executive Committee does not approve of the recommendation as written and recommends that it be referred to the American Council on Pharmaceutical Education for further study.

In a supplementary report, Dean Jordan presented a request for the Conference of Teachers of Pharmacognosy and Pharmacology that the Executive Committee recommend the appointment of a committee to study the conditions effecting the study of Botany. This was adopted and the committee appointed.

Chairman J. G. Beard reported for the Syllabus Committee. He directed attention to the fact that there is less unanimity of opinion about the subject matter of pharmaceutical education than of any other type of organized education.

Dean R. A. Lyman presented a paper, "The American Association of Colleges of Pharmacy in Its Relation to the American Council on Education." He recommended the appointment of a Problems and Plans Committee as a standing committee of the Association whose function it will be to study the problems which most concern pharmaceutical education and work out plans for comparative research of a pharmaceutical and educational nature. The report was adopted.

Dean Ernest Little reported for the Committee on Qualifications for Admission to Membership in the Association. Dean Little reported that the Committee had been out of work for three years; that last year a report had been submitted and the entire session had been given to its discussion. The report was accepted and a copy sent to each member college. The report was submitted and voted upon paragraph by paragraph, and adopted.

Prof. Charles Stocking reported for the Committee on Educational Standards; Prof. A. B. Nichols for the Committee on Activities of Students and Alumni. Prof. Schlicting, through Dr. C. E. Caspari, reported for the Committee on Relations of Boards and Colleges.

The report of the Committee on Student Branches of the A. PH. A., by George L. Webster, was read by Dr. W. F. Rudd.

The report of the Committee to study the list of crude drugs prepared by District No. 2, Dr. E. V. Lynn, Chairman, was read by Dr. B. V. Christensen. This Committee is to be increased and the work continued.

The report of the representative on American Council of Pharmaceutical Education was presented by Dr. A. G. DuMez. He stated that the Council had not yet begun to function except to act upon some special matter because there has been a lack of funds. Plans call for $200 from each Association to start work on methods for standardizing of schools.

The Council has under advisement a matter of undertaking a study of practical experience, a question referred to it by the American Association of Colleges of Pharmacy. Another question which has been referred to the Council was "What Advance Credit Shall Be Given for Work Done by Pharmaceutical and Non-Pharmaceutical Member Colleges?"

Dr. H. W. Youngken reported on Biological Abstracts; Dr. Glenn L. Jenkins for the National Conference on Pharmaceutical Research; Dean J. G. Beard for the National Drug Trade Conference. Dr. Paul Olsen reported for the Druggists Research Bureau and Prof. R. E. Terry for the National Association of Retail Druggists. Dean Edward Kremers reported on the progress of his work as Historian. The reports were accepted.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

The Committee on Resolutions, consisting of Dr. W. J. Husa, Chairman, Prof. R. E. Terry, Profs. C. H. Stocking, Dr. B. V. Christensen and Dean A. O. Mickelsen submitted the following report:

A Resolution of Appreciation of President L. D. Havenhill's services was adopted.

"The President's address contained a recommendation that the Association view with disfavor the merging of schools of pharmacy with other schools or departments, that the Chairman of the Executive Committee register vigorous protest to any and all instances of this character. We are in accord with the view that every effort should be made to prevent the loss of autonomy

and professional organization, but we foresee that cases may arise in which the merger of two or more colleges of pharmacy might be beneficial in states having too many colleges of pharmacy. Accordingly, we offer a restatement of the resolution as follows:

"WHEREAS, the merger of colleges or schools of pharmacy with other schools or colleges may result in serious loss of autonomy and professional organization,

"*Resolved*, that the Executive Committee consider such mergers individually and take whatever steps seem to be advisable to maintain pharmaceutical education at a proper level of professional independence."

"The president recommended that the Committee on Curriculum and Teaching Method make a study of the Syllabus to determine possible improvements and adjustments."—Approved.

"In connection with the previous recommendation the president recommended that the Committee on Curriculum and Teaching Methods be increased from five to ten members. We feel that this change would result in a more unwieldy and less effective committee."

"With further reference to the President's Address, we do not concur in the suggestion that it would be feasible to divide the four-year course into a two-year lower division of non-technical instruction, with all professional work to be crowded into the last two years."

"Dean Adolph Ziefle made four recommendations regarding the relation of the pharmaceutical curriculum to premedical training. The Committee takes the position that pharmacy should be viewed as an end in itself, as a preparation for service through pharmacy, rather than as a preliminary training for another profession.

"We therefore disapprove the four recommendations concerning steps to be taken to obtain greater recognition of pharmacy as premedical training. In reaching this decision we also had in mind the careful study made recently by the Committee to confer with the Executive Council of the Association of American Medical Colleges."

"Dean Ziefle recommended that steps be taken 'To determine whether it is feasible to offer the degree of Bachelor of Arts in Pharmacy.' "—Not approved.

"Dean Ziefle recommended that certain steps be taken 'To encourage the members of pharmacy faculties to give lectures and demonstrations in the general courses in hygiene and first aid and to offer courses of instruction in nurses' training schools.' We do not feel that it is necessary to reëstablish a committee to study this question."

"We approve of the three recommendations in Dean W. F. Rudd's paper:

"'*First:* That we urge our member-colleges to give the teaching of public health increasing emphasis and as far as possible use city and state public health officials in our faculties.' " The latter statement was interpreted by the committee as meaning that occasional lectures be given by public health officials.

"'*Second:* That inasmuch as all drug commodities are primarily health concerns we go on record as urging that the manufacture, jobbing and retailing of these commodities be under the direct control of properly qualified pharmacists; and further that our action be broadcast to constituent members of all organizations represented in the National Drug Trade Conference and that we ask their support as a public health measure.'

"'*Third:* That inasmuch as the matter of standards of drugs, cosmetics, etc., is of primary concern in public health, and since the colleges of pharmacy are in a neutral position between manufacturers of these products and government officials who are responsible for the enforcement of proper standards that we offer our services as a sort of liaison group between the interested parties, whenever it would seem to either side that the educators can serve the cause of public health.' " The report was accepted and the recommendations adopted.

The following papers were presented:

"The Relation of a Pharmacy Curriculum to Premedical Education," by Dean Adolph Ziefle.

"The Public Health in Pharmaceutical Education," by Dean W. F. Rudd.

The resignations of the Medical College of the State of South Carolina, School of Pharmacy, and of Meharry Medical College, Department of Pharmacy, were accepted.

The following officers were elected: *President*, Dean Ernest Little, Newark, N. J.; *Vice-President*, Dean Antone O. Mickelsen, Portland, Ore.; *Secretary-Treasurer*, Zada M. Cooper, Iowa City, Iowa; *Chairman, Executive Committee*, C. B. Jordan, La Fayette, Ind.; *Members of Executive Committee*, to serve two years: Dean L. D. Havenhill, Lawrence, Kans.; A. G. DuMez, Baltimore, Md.; *Member of the Syllabus Committee*, L. W. Rising.

JOINT SESSION.

The Joint Session of the American Association of Colleges of Pharmacy and the National Association Boards of Pharmacy is reported in the report of the latter in this issue of the JOURNAL. This also contains the title of discussions and other reports made at the Joint Session.

TEACHERS' CONFERENCES.

PHARMACY, CHAIRMAN, DR. FREDERICK V. LOFGREN.

The following papers were read and discussed: "Theory of Pharmacy and Academic Standards," by W. Paul Briggs. "The Grading of Preparations Made in the Pharmacy Laboratory," by Adley B. Nichols. "The Method of Approach in Teaching the Pharmacy of New and Non-Official Remedies," by Marvin J. Andrews. "Teaching Students How to Approach the Physician," by L. Wait Rising. "Some Observations after Many Years of Teaching Pharmaceutical Mathematics," by Edward Spease.

Two papers were read by title: "A Comparison of the Four-Year Curricula in Pharmaceutical Subjects," by Dr. Burlage and one dealing with dental preparations by Dr. Richards. At Dean Beard's suggestion it was voted that two papers on the Syllabus should be presented at the next year's meeting.

Officers elected for the ensuing year were: Dr. W. G. Crockett, *Chairman*, L. W. Richards, *Vice-Chairman*, and Dean Emery T. Motley, *Secretary*.

CHEMISTRY, CHAIRMAN, DEAN HUGH E. MULDOON.

The following papers were presented and discussed: "Teaching Urinalysis to Pharmacy Students," by Antoine E. Greene; "Teaching Organic Pharmaceutical Chemistry," by Glenn L. Jenkins; "How Should Fundamental Courses in Chemistry Be Taught in a College of Pharmacy," by Ernest Little. "Teaching Organic Chemistry to Pharmacy Students," by J. R. Harrod.

Officers elected for the ensuing year were: *Chairman*, Prof. Marion L. Jacobs and Dr. John C. Bauer, *Secretary*.

PHARMACOGNOSY AND PHARMACOLOGY, CHAIRMAN, C. W. BALLARD; TEMPORARY CHAIRMAN, PROF. F. H. EBY.

The following papers were read and discussed: "Why Study Botany?" by C. C. Glover; "The Botany Course as a Foundation for Pharmacognosy," by O. P. M-Canis; "The Botany Course as a Foundation for the Pharmacognosy of Root Drugs," by B. V. Christensen; "The Botany Course as a Foundation for the Pharmacognosy of Stem and Bark Drugs," by C. C. Albers; "The Botany Course as a Foundation for the Pharmacognosy of Leaf Drugs," by H. W. Youngken; "The Botany Course as a Foundation for the Pharmacognosy of Fruit Drugs," by J. Hampton Hoch; "The Botany Course as a Foundation for the Pharmacognosy of Seed Drugs," by F. J. Bacon; "The Botany Course as a Foundation for Pharmacognosy," by George W. Fiero; "The Value of Habitats in the Study of Pharmacognosy," by E. H. Wirth.

It was voted that the conference should draft an outline on the subject of botany and suggest the minimum number of hours which should be given on that subject in the pharmaceutical curriculum. The Conference adopted a resolution requesting the Executive Committee of the Association to recommend the appointment of a committee to study the conditions surrounding the study of botany.

Officers elected for the ensuing year were: *Chairman*, Prof. A. John Schwarz; *Secretary*, Dean Charles E. F. Mollett.

ECONOMICS.

Owing to the illness and death of Prof. Amrhein, no program of papers had been prepared. Dr. Paul C. Olsen, *Secretary*, presided.

Wroe Alderson addressed the conference about NRA and its effect on the retail drug business. The address was followed by general discussion.

Officers elected for the ensuing year were: *Chairman*, Dr. Paul C. Olsen; *Secretary*, Dean John F. McCloskey.

ABSTRACT OF PROCEEDINGS OF THE THIRTY-FIRST ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION BOARDS OF PHARMACY HELD IN WASHINGTON, D. C., MAY 7 AND 8, 1934.

The thirty-first annual meeting of the National Association of Boards of Pharmacy was exceptionally well attended, 88 delegates being present from 34 states, and also ten honorary members, making the total attendance 98.

President Gilbert's address is printed in May issue of the JOURNAL, A. PH. A.

The report of the Executive Committee included a statement of income and expense from July 1, 1933 to April 30, 1934, showing a cash increase of $289.88 with total cash assets of $5865.55. A new budget for the fiscal year ending June 30, 1935 totaling $14,400 was outlined—a reduction of $335 over the previous year. The secretary was also authorized to sign a lease for one year at $110 per month for the offices at 130 N. Wells St., Chicago.

The report contained one recommendation—that the offices of the Association be moved to the headquarters building of the American Institute of Pharmacy in Washington by May 1935, if possible.

Secretary Christensen, in opening his report of the activities of the central office, stated that he had completed his twentieth year of service, and then made an interesting comparison of conditions twenty years ago with those of to-day.

A detailed financial statement was included, showing cash in the secretary's accounts as of June 30, 1934—$1604.07. The number of official applications issued during the ten-month period was 414—the total for the fiscal year was estimated at 500.

Treasurer J. W. Gayle reported total funds on hand in his accounts of $4261.48, this report also being accepted and filed.

An important question came up—that of providing work for college students, under the code, who need practical experience to meet the board entrance requirements. The students cannot get jobs at code wages and no employer will take them at less or even without salary, as doing so is a violation of the code. The suggestion was made that a joint committee of the three associations—National Association Boards of Pharmacy, AMERICAN PHARMACEUTICAL ASSOCIATION and American Association Colleges of Pharmacy, be appointed to study the situation and bring it to the attention of the code authorities so that some special provision for this training can be made.

The new *Committee on Minimum Standards of Technical Equipment*, A. C. Taylor (D. C.), Chairman, had done a great deal of work. The report included a list of essential equipment for a pharmacy—the list having been compiled with the idea of making this the minimum.

Chairman Roy B. Cook's report for the *Committee on Re-Districting* resulted in the amendment of the By-Laws, which see.

Director R. L. Swain made a brief report for the *Department of Education*, with the recommendation that it be continued, although inactive for the time being on account of financial conditions.

RESOLUTIONS.

Chairman A. C. Taylor presented the following resolutions:

Resolved, That the National Association of Boards of Pharmacy hereby recognizes that the stability and security of pharmacy and the protection of public health depend largely upon an adequate and honest enforcement of the pharmacy laws of the respective states, and that the Boards of Pharmacy or other duly legalized enforcement agencies be upheld and encouraged in their law enforcement efforts.

Resolved, That the National Association of Boards of Pharmacy recommend to the member boards that an average of 75% be required for passing the practical examination and that this grade be made compulsory beginning with the graduates who graduate in 1936 and that it shall not be retroactive in reciprocity.

Resolved, That the National Association of Boards of Pharmacy give its whole-hearted and unreserved approval to all efforts to improve Federal and State Food and Drug Laws so that these laws will make for the necessary protection of the consuming public, providing, however, that such legislation does not confer unwarranted arbitrary discretionary powers upon enforcement agencies.

Resolved, That every member board at present without a college graduation requirement (Arizona, Delaware, Massachusetts, Nevada, New Mexico, Tennessee and Vermont) immediately and seriously undertake to work for the enactment of such legislation, setting the year 1940 as a goal when every board shall be operating under a compulsory graduation requirement.

Resolved, That the Legislative Committee be instructed to make a study of the problem of abolishing the assistant grade of certificate under the various state laws and present a definite outline or uniform plan for accomplishing this, without granting to the holders of outstanding assistant licenses any privileges other than those originally conferred by the law.

AMENDMENT CONSTITUTION AND BY-LAWS.

The member States of this Association shall be grouped into the following eight districts (grouping may include prospective member Territory):

District No. 1: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.
District No. 2: New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, Virginia and West Virginia.
District No. 3: North Carolina, South Carolina, Georgia, Alabama, Mississippi, Tennessee, Florida, Puerto Rico.
District No. 4: Wisconsin, Michigan, Illinois, Indiana, Ohio, Kentucky.
District No. 5: North Dakota, South Dakota, Nebraska, Minnesota, Iowa.
District No. 6: Texas, New Mexico, Louisiana, Arkansas, Kansas, Oklahoma, Missouri.
District No. 7: Montana, Idaho, Wyoming, Utah, Colorado.
District No. 8: Washington, Oregon, Nevada, California, Arizona, Alaska.

The question of adding a paper on Pharmaceutical Jurisprudence to the regular board examination had been referred to the Committee on Constitution and By-Laws for report. After considerable discussion, a special committee was authorized to give the matter a full and complete study for report in 1935, inasmuch as a more adequate law enforcement program is needed.

The election of officers resulted as follows:

Honorary President, F. W. Hancock, North Carolina; *President*, Charles H. Evans, Georgia; *Secretary*, H. C. Christensen, Illinois; *Treasurer*, J. W. Gayle, Kentucky; *Executive Committee Member*, C. Thurston Gilbert, Connecticut; *Syllabus Committee Member*, Robert W. Sterling, Illinois; *Resolutions Committee Member*, Frank Milne, Kansas; *Vice-Presidents*, George Moulton, New Hampshire; John M. Woodside, Pennsylvania; E. V. Zoeller, North Carolina; Albert Ely, Kentucky; William Muesing, Minnesota; C. M. Brewer, Oklahoma; R. M. Shultz, Wyoming; R. W. Fleming, Nevada.

JOINT SESSION.

Dr. Mordecai W. Johnson, President of Howard University, was the first speaker and delivered an address on "Professional Education of the Colored Man."

A most distinguished visitor, Senator Royal S. Copeland, reviewed the Pure Food and Drug Bill, S 2800.

Dr. B. F. Christensen of the University of Florida opened the discussion on: "Shall we have a general standardizing agency for recognition of colleges of pharmacy by boards of pharmacy or shall each state board act as its own standardizing agency?" Considerable spirited discussion ensued, until finally the report of the American Council on Pharmaceutical Education, which is the logical standardizing agency, was called for and presented by Dr. A. G. DuMez, secretary.

Dr. C. B. Jordan read a paper, "Acceptance of Credit from Colleges of Arts and Sciences toward a Degree in Pharmacy—Is the Spirit of the Four-Year Course Being Fulfilled?"

The action taken by the N. A. B. P. in redistricting was outlined and the A. A. C. P. approved of the new districts and will carry out the same plan.

The closing paper was read by Dr. R. P. Fischelis—"The Trend of Student Enrollment in Colleges of Pharmacy as Revealed by a Study of Enrollment Figures for Past Ten Years." In the discussion of the report, the loss of foreign students was emphasized and a motion was adopted requesting the AMERICAN PHARMACEUTICAL ASSOCIATION to consider the advisability of calling to the attention of the people of Central and South America the advantages of pharmaceutical education in the United States.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meeting of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter.

CHICAGO.

The last monthly meeting of the Chicago Branch for the school year of 1933–1934 was held Tuesday evening, May 15th, at the University of Illinois College of Medicine.

The speaker of the evening was Dr. William F. Petersen, professor of Pathology and Bacteriology, University of Illinois College of Medicine. The subject was "The Patient and the Weather." Dr. Petersen gave a lengthy discussion, accompanied by lantern slides, showing the relationship that has existed in many cases between the rise and fall of the health of patients and the barometer.

It was pointed out that records prove that climates do have an effect upon the human being. Next it was suggested that the condition of the air cannot be escaped by the human being, even if within the confines of a room. Comparative graphs were shown which would lead one to believe that such a statement might be true. It was also pointed out that maybe the weather has an effect upon our embryonic development that directs much of our physical and mental growth.

Comparative graphs were flashed before us in such a rapid fire order it would be hopeless in this short space to give a detailed account of the discussion.

LAWRENCE TEMPLETON, *Secretary.*

NEW YORK.

The May meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on May 14, 1934, at the College of Pharmacy, Columbia University. There were about forty-five members and guests present.

The meeting was called to order by President Charles W. Ballard and the minutes of the previous meeting were read by the secretary and approved.

Treasurer Currens reported the treasury with a balance on hand, May 14th.

Dr. Bilhuber reported for the Audit Committee.

Chairman Lehman, of the Committee on Education and Legislation, spoke briefly on pharmaceutical legislation which was being supported by the State Association at Albany. Unfortunately, changes had been made in Bill 417, regulating the sale of preparations containing poisonous or deleterious substances, which materially weakened the measure.

Legislation was being encouraged which would make it a violation for a store without a pharmacy license to have on hand stocks of Tincture of Iodine for sale. This was aimed especially at the so-called Cosmetic Shops.

President Ballard called upon Dr. H. H. Schaefer to report on the A. PH. A. Convention in Washington. He stated that the attendance was as good as could be expected under the circumstances. He called particular attention to the fact that the Remington Medal was presented to Sir Henry Wellcome at the banquet in the Shoreham Hotel on Tuesday night, May 8th.

Dr. Fischelis presided at the presentation. On the forenoon of May 9th, the official dedication ceremonies were held for the new pharmacy headquarters building. The exercises were held in front of the building and a very large group was present. The services were very inspiring.

President Ballard called attention to the fact that Dr. Kassner[1] was seriously ill with pneumonia.

The business part of the meeting having been completed, President Ballard introduced the speaker for the evening, Dr. Johannes S. Buck, who spoke on the Chemistry of Papaverine. The speaker opened his address by discussing the occurrence of the alkaloid in the opium poppy. Papaverine appears in the white poppy after 36 days and is present in opium to the amount of 0.5% to 1%, averaging generally about 0.5%. There are about 20 other alkaloids present in opium. The separation of the alkaloids is a long and tedious process of considerable expense; the method was outlined by the speaker. He also pointed out that papaverine is usually separated out along with narcotine. Papaverine was discovered by Merck in 1848 who reported its correct composition.

Since Professor Diehl at Minnesota suggested the use of papaverine and codecine in the treatment of the common cold, very considerable interest has been aroused concerning the possibilities of a practical synthesis. The success of the mixture in treating colds has made it necessary to investigate the possibility of synthesis since it is present in such small amounts in opium that the supply is negligible when compared with what the demand might easily become. Since codeine is readily prepared from morphine a sufficient supply is available, however, since both ingredients are narcotics, Dr. Buck felt that the remedy would never become popular.

The speaker discussed the early work done by Goldschmidt on the structure of papaverine. This investigator worked for twenty years on the problem but did not solve it. During this part of his address Dr. Buck described the general process for determining the structure of an alkaloid by studying its degradation products, formed by oxidation with potassium permanganate. He described several processes for the synthesis of the alkaloid which have been employed experimentally. The possibility of the commercial application of these was also considered. Difficulties in manufacturing the necessary intermediates have thus far proved to be the greatest problem in a successful scheme. Research on this part of the problem is being diligently pursued and it is hoped that a practical method giving good yields at reasonable costs will yet be developed.

Considerable interest in the subject was shown by the audience in the numerous questions asked the speaker at the close of his address. Dr. Buck was voted a rising vote of thanks.

RUDOLF O. HAUCK, *Secretary*.

THE COÖPERATION OF THE HOSPITAL PHARMACIST AND STAFF.*

BY WILLIAM GRAY.[1]

Pharmacy is an indispensable branch of medicine and the pharmacist who renders good service will receive the consideration and respect from his fellows that he deserves.

The work of the hospital pharmacist differs materially from that of the pharmacist in the retail drug store; to the hospital pharmacist the most important part of his work is service, while the pharmacist in a drug store is more interested in sales. The hospital pharmacist must keep in close touch with the advances in professional pharmacy and be acquainted with the new remedies as they come into use, as well as with pharmaceutical progress in general. He must always stand ready to coöperate efficiently with the medical staff and the administrative staff of the hospital.

When new drugs appear on the market, the medical staff is usually in a position to know, or to desire to know, whether the proposed remedy is of real value or meets a need in a new way, or whether it is just one more trade variation of a standard remedy or an old one dressed up in

[1] Deceased, see page 524, May issue of the JOURNAL.

* Chicago Branch, A. PH. A.

[1] Pharmacist to Presbyterian Hospital, Chicago, Ill.

new clothes. The pharmacist should be in a position to furnish information on these points and should gladly assist in getting the necessary information to the staff. In this way, needless loss of time to the staff and expense to the patients and the hospital can be avoided. He must be able to suggest officially recognized and tested medicines as against more expensive proprietary or branded products. This necessitates having at hand the most complete information available, in such standards as the U. S. P., the N. F. and N. N. R. He should suggest and be prepared to demonstrate to the individual members of the medical staff that although there are many valuable non-competitive proprietary articles, many of these are the same in composition as official U. S. P. and N. F. preparations. We define as proprietary those articles with copyrighted names. Attention should be called to the fact that there is a loss to the hospital when different brands of the same drug are prescribed, as this necessitates duplication of the drug stock and a heavier investment in the drug room and that unless the prescriber has a particular reason for doing so, no brand names should be specified.

COÖPERATION WITH THE ADMINISTRATIVE STAFF.

In the Presbyterian Hospital the pharmacy supplies about twenty units. We have no dispensary or out-patient departments, these being taken care of by the Central Free Dispensary and Rush Medical College. Our system is therefore designed to supply purely hospital needs.

Each unit sends in a daily written order and the order is returned with the supplies to the unit. With the exception of a few special prescriptions, there are no individual prescriptions put up in the pharmacy. The individual doses prescribed by the physicians are taken care of by the nurses under the supervision of the head nurse on the floor.

The dispensing of individual doses saves materials, it saves the time of the physicians and internes, it saves time in reaching the patient, and it makes for lessened demands on the time of the pharmacist, as such doses can be prepared in advance when he is not otherwise busy. These stocks of standard drugs are kept, readily available, in the medicine cabinets on the hospital floors.

Every conceivable dosage of medicine is prepared for use on the floors in such form that there is practically no danger of overdosage. The nurse is not allowed to divide or multiply doses; that is to say, should the nurse have an order for 1/50 grain she must not use two 1/100 grain doses. If 1/50 grain is not in stock the interne has to rewrite the order to read two 1/100 grains and by the same token she must not divide 1/50 grain to get 1/100 grain. In the latter case the pharmacist must do the dividing. This rule applies principally to ready made tablets. No verbal orders for medicines are accepted by the nurses except in cases of emergency.

All single doses of capsules, pills and suppositories are safe, that is, not above a maximum dose, and therefore, taking the human equation into consideration, should a wrong item be given it would not be a lethal dose.

The only exception to this is in the operating room where mercuric chloride tablets are kept and used in making solutions for antiseptic purposes. The mercuric chloride solutions used in the other units are prepared by the pharmacist, who, with a few exceptions prepares all solutions used in the hospital. We feel safe in saying that this system of handling drugs will safeguard all concerned.

The need for keeping the expense of hospitalization as low as is compatible with efficient service is now widely recognized. This need will be served if the prescriber can be induced to use official titles instead of trade-marked names. These names are listed in N. N. R., a book that is in the hands of most prescribers.

If we stocked all of the many brands of serums, vaccines, ergosterols, cod liver oils, malt extracts and compounds of the latter, we would tie up a lot of money that might be put to better advantage. When a better product is sold under a trade name the specification of that particular brand may be warranted, but many of the trade-marked brands comply only with the fixed minimum standards of the U. S. P.

While the cost of ingredients is often passed on to the patient and therefore does not immediately concern the hospital, both physicians and laymen are taking notice of the increasing cost of illness, and whatever is done to lessen the cost without lessening the efficacy of the treatment will be of direct benefit to the patient and indirectly will benefit the physician and the hospital.

Another service that the hospital pharmacist may well be called on to give is the teaching of the rudiments of drugs, weights and measures to the nurses in training.

At the Presbyterian Hospital we deal only with the practical side of such training. We think a few lectures, in the time allotted would have little, if any, value; while a practical course has proved not only valuable to the nurse, but has the effect of safeguarding the patient as well as the hospital.

The course is given to the student nurse only, and is of one month's duration. The work is classified and checked. All work is supervised, whether it be only filling small containers from larger ones, making dilute alcoholic and antiseptic solutions, mouth washes, mixing, dividing and folding powders, filling capsules, making suppositories or preparing ointments.

The first week is taken up with filling containers with simple items such as Boric Acid, Magnesium Sulphate, etc.; the second week in preparing medicinal solutions and in mixing powders. This is where the nurses come into close contact with all sorts of weights and measures. The last part of the training is taken up with preparing ointments, suppositories and miscellaneous items requiring more experience than is necessary in the early stage.

Student nurses of the present day are exceptionally well qualified from the standpoint of previous education. Many of them have taken or are taking college degrees. All of them know the tables of weights and measures, and all have learned to translate percentages and decimals into common fractions and *vice versa*. They have learned these things, however, in the way that most people have learned them—as abstract exercises, unconnected with actual practise. The principal objective of their training in the drug room is to correlate this theoretical knowledge of weights and measures with the physical size of the various units.

We do not give a final examination but give a review after the pupils have left the drug room. The principal feature of the review is a quiz on pharmaceutical arithmetic, to satisfy us that the future nurse has developed a sense of proportion and has a thorough knowledge of weights and measures.

As may be surmised, it is not possible to follow any set plan or course of instruction. The demands on the Pharmacy from day to day or from hour to hour determine the work done by the pupils. We believe, however, that the educational value of their work is all the greater since the purpose is not to pour into the minds of the pupils as large a mass of information as possible, but to vitalize what they do know.

Finally, the successful hospital pharmacist is an enthusiast who loves his work and, no matter how exacting it may be, finds it interesting at all times.

ARMY HOSPITALS TO BE STANDARD.

Maj. Gen. Robert U. Patterson, surgeon general of the Army, has taken steps further to improve and standardize the service of Army station and general hospitals, so they will be maintained on a standard well above the minimum required by the American College of Surgeons.

WARNING ON POISON LABELS.

The New York Pharmacist states: "Section 122 of the Sanitary Code provides that all bottles or boxes containing poison shall bear a label upon which shall be conspicuously printed or stenciled in red ink, in plain legible characters, the name of the substance or article, the word 'POISON,' the name and place of business of the seller, or donor, a skull and crossbones, the word 'CAUTION,' the maximum dose of the poison and the antidote therefor.

"The provisions of this section do not apply to medicinal compounds containing poisonous drugs in therapeutic doses when the maximum dose of such preparation is marked upon the container.

"A. Medicines of all types are not merchandise and therefore require the adoption of a policy, looking to the control of their sale.

"B. If a pharmacist wants to open a pharmacy, the State Board should have the right to approve or disapprove the project.

"C. The State Board should have the right to decide what products, preparations, etc., should be sold in registered pharmacies only.

"D. By the same token, the State Board should have the right to license manufacturers.

"E. Any person or concern in the State, manufacturing any medicinal item, including cosmetics, should be required first to obtain a license to do so from the State Board."

THE SECTIONS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

THE ABSTRACTS OF THE MINUTES OF THE SESSIONS HELD IN WASHINGTON, MAY 9 TO MAY 12, 1934.

(See also brief summary in reports, Final Session, House of Delegates, printed in the June JOURNAL and titles of papers will be given in the minutes; discussions, if any, will be printed when paper is published, if not included in the minutes. The Editor will be thankful for corrections of errors.)

Abstracts of a large number of papers were distributed at the meetings, some have been printed. Abstracts of some papers are still obtainable by addressing the JOURNAL A. PH. A., *2215 Constitution Ave., Washington, D. C.*

SCIENTIFIC SECTION.

The First Session of the Scientific Section was called to order by Chairman F. E. Bibbins, May 9th, at 2:15. The Chairman, in the absence of the Vice-Chairman, requested Secretary L. W. Rowe to act as Chairman while he read his address. The Chairman's Address follows:

THE CHAIRMAN'S ADDRESS.

BY F. E. BIBBINS.

Members of the Scientific Section and Guests:

By a custom followed for so many years that it has practically become a law, it is expected that the Chairman will open the session of the Scientific Section with the "Chairman's Address."

It is a pleasure to welcome you who have found time to be present at our session, in spite of the many attractions and places of interest in this our Capital which are also calling you. I wish also to extend our thanks to those who have contributed papers and thus made our program possible. The meeting this year, coming so early, with practically no advance notice, made it difficult for many of our members to finish their investigations and complete their papers in time for this early meeting.

The Chairman's Address in times past has consisted of a brief review of the progress and developments in pharmaceutical research. A glance at the list of papers on our program indicates that this review is unnecessary this year. I think that we are to be congratulated upon the variety of papers, representing so many different pharmaceutical interests.

At last year's session there was considerable discussion concerning the work and policy of the *Board of Review of Papers*. This board has been in existence for several years, but for some reason or other they were seldom consulted or their advice sought regarding the publication of papers. This year I appointed a committee of seven, with our Secretary as Chairman. The personnel of this committee was selected so as to include men interested in Pharmacology, Chemistry, Pharmacy and Pharmacognosy. With this representation we felt that we would have on the committee some one qualified to pass on papers relating to all the different subjects presented to our section. It was necessary early in the year to pass a few papers for publication without referring them to the Board of Review of Papers, in order to give Editor Eberle copy for the JOURNAL. The balance of the papers was referred to the individual member of the committee best qualified for review before publication. The committee report to be received later in these sessions will tell us more of their activity.

The *Committee on Monographs* was continued with its original personnel, so that there would be no interruption in their work of finishing the monograph on Aconite. This was a formidable undertaking, much larger than the committee realized when they first took over the work. This monograph is practically finished. The question to consider now is: How and where can it be published? Your Chairman has no recommendations to make, but thinks we should all give this question some serious consideration.

Committee on Ebert Prize.—I wonder how many of you have given any thought to the operations of this committee, and the difficulties under which they work. We look forward each year to this report naming the author selected to receive this prize, little realizing the sacrifice that it

has meant on the part of some of the members of our committee to make this selection. I was very much surprised about ten days ago to learn that this committee did not receive promptly all of the papers presented to the Scientific Section for consideration. I found that the only papers which they can review between our annual meetings are those which Editor Eberle has been successful in publishing in the JOURNAL, then when the committee gathers for the annual meeting the real work begins. The Editor turns over the manuscripts of the unpublished papers, some of which are very lengthy, and the committee, with their limited time, has to consider both the published and unpublished papers. This requires a lot of effort and hard work, and it also takes a lot of time. I am sure that some of the committees on the Ebert Prize have worked far into the night on this job. This is certainly unfair to the committee, to ask them to consider so many papers in so limited a time, and may also be unfair to the authors, because, without sufficient time for consideration, a paper's value may not be recognized.

To correct this condition, I believe the papers should be available to the committee soon after the annual meeting. In order that this may be done, I wish to recommend the following change in our By-Laws. Chapter IX, Article VIII, reads as follows:

"*Disposal of Papers and Reports.* All papers and reports presented to the section become the property of the ASSOCIATION and shall be forwarded to the Editor of the JOURNAL immediately following the annual meeting by the Secretary of the Section."

I wish to recommend that it be changed to read as follows:

"*Disposal of Papers and Reports.* All papers, which shall be in duplicate, and reports presented to the Section become the property of the ASSOCIATION; one copy of the papers and the reports shall be forwarded to the Editor of the JOURNAL immediately following the annual meeting of the Section; the other copy of the papers shall be submitted to the Committee on Ebert Prize by the Secretary of the Section."

At this time I wish to express my appreciation of the honor which you have conferred upon me by making me your Chairman during the past year. I also want to acknowledge the splendid coöperation of the other officers and committees. I wish to extend particular credit to our Secretary, because it is largely through his planning and untiring effort that many of the papers on this year's program were obtained.

I trust that we will have a pleasant and instructive session during our meeting here.

On motion by James C. Munch and seconded by E. E. Swanson, the Chairman's Address was referred to a committee. Acting Chairman Rowe appointed as a Committee: *Chairman*, Glenn L. Jenkins; H. W. Youngken and James C. Munch.

Editor Eberle brought greetings and extended wishes for a successful meeting.

The Secretary's Report was called for.

Secretary Rowe reported verbally that the preliminary call for papers for the 1934 program of the Scientific Section was printed in the February number of the JOURNAL A. PH. A. This was followed on March 21st by a notice to 270 members of the section. The report was good considering the short time available, 75 titles and 70 abstracts were received for the program. He stated that considerable correspondence was necessary and the assistance of the authors of papers as well as of the Chairman of the Section was very helpful and appreciated.

The next order of business was Reports of Committees.

Chairman E. E. Swanson of the Committee on Monographs requested that the report be deferred to the Joint Session. It was so ordered.

Chairman L. W. Rowe reported for the Board of Review of Papers. He stated that seven members of the committee had coöperated in the examination of about 65 papers which were presented at the Madison meeting. This has involved considerable correspondence and the fine spirit of coöperation evidenced by Editor Eberle and by other members of the committee is very gratefully appreciated by the Chairman. The report was received.

Chairman J. C. Krantz, Jr., reporting for the Committee to coöperate with the National Conference on Pharmaceutical Research, stated that there would be no report.

Chairman Bibbins appointed the following on the Committee on Nominations: *Chairman*, E. E. Swanson; F. F. Berg, Fred V. Lofgren.

Chairman Bibbins said that before proceeding with the reading of papers it might be

well to state that if any changes in the By-Laws were made it would be necessary to bring in the report at the next session.

The reading of papers was proceeded with as follows:

"The Effect of Hydrogen Peroxide and Some Oxygenated Terpenes upon Ascaris Lumbricoides," by L. W. Butz and W. A. LaLande, Jr. (No discussion.)

"A New Method for Determining Acetyl Salicylic Acid in the Presence of Other Medicinal Products," by R. M. Hitchens. The author supplemented the paper at considerable length.

"Drugs and Bugs," by Ernst T. Stuhr. The paper was read by Adolph Ziefle, also, "Some Pharmacological Properties of Umbellulone." (No discussion.)

Miss Nellie Wakeman was introduced by Dr. Edward Kremers and presented a paper, "A Chemical Examination of the Entire Plant of Celastrus Seandens." (No discussion.)

Edward Kremers presented the following papers in abstract:

"Analysis of Reduction Products of Catnip Lactone;" and "Arsenoso Addition Products of Unsaturated Hydrocarbons." (No discussion.)

Dr. David I. Macht presented the following papers: "A Pharmacological Note on Phytolacca;" and "Penetration of Volatile Oils and of Fixed Oils and Fats through the Intact Skin." The author introduced his subjects in the following:

"I present two communications before this meeting with a purpose. I understand that it will be the primary aim of the Institute of Pharmacy, which is to be established here in the near future, to investigate pharmacopœial and other officially recognized drugs. I have recently been working on problems illustrating two different phases of such investigation. One may be called a *de*structive problem because it reveals the uselessness of a preparation still officially recognized in the U. S. P. and National Formulary. The other research concerns a *con*structive problem and deals with the pharmacology of a large number of drugs officially recognized in the U. S. P. but regarding the physiological action of which we know very little.

"The first research deals with the pharmacology of *Phytolacca*. This drug has been recommended by the old authorities for a large variety of conditions, yet there is practically no laboratory support for its therapeutic usefulness nor is there any strong clinical evidence in its favor. I have been experimenting with a fluidextract of *Phytolacca*. Its pharmacological action was studied by direct application to the mucous membranes, by injection—subcutaneously, intramuscularly and intravenously—into higher animals, and by various other methods, which will be described in a separate paper. It was found that *Phytolacca* is very irritating to the mucous membranes. This drug was also discovered to be very toxic on injection in mice, rats, guinea pigs and cats. When administered to cats under ether anesthesia, *Phytolacca* was found to be very depressant for both circulation and respiration of these animals. Additional studies made on kidney function and liver function revealed that neither of these was markedly affected by oral administration of the drug. No other pharmacological finding, however, supported any of the therapeutic uses to which *Phytolacca* has been applied; and the entire evidence indicated that this drug is absolutely worthless and might well be discarded from the National Formulary and Pharmacopœia of the United States.

"The second investigation, of more constructive and profitable character, deals with the absorption of the fixed and volatile oils and fats through the intact skin. I have undertaken this study because we have been interested in finding a vehicle which will promote the absorption of effective medicaments when applied to the skin. The study was begun with a comparison of ointments prepared from vaseline, lanolin, lard, vanishing cream and falba base. Ointments made with these vehicles contained a number of powerful pharmacological agents, but it was found that none of them promoted much absorption through the intact skin. Contrary to the prevalent belief, there is little difference between lanolin and vaseline in effectiveness. Of the fixed oils or fats which we studied, lard seemed to promote absorption more than the other fats.

"It then occurred to me that various volatile oils might perhaps be better carriers for medicaments than the ineffective fixed oils and fats. This consideration was certainly supported by historical evidence because the ancients used volatile oils extensively in embalming and preserving as well as in treatment of various skin affections. I have therefore begun a study of a series of such officially recognized volatile oils as oil of cloves, oil of wintergreen, oil of lemon, oil of orange, oil of sassafras, oil of cinnamon, etc. It was found that these oils, when applied

alone to the skin of such small animals as mice, were rapidly absorbed, produced toxic symptoms and usually led to death, if a sufficient amount was administered.

"The next step was to incorporate a powerful pharmacological agent in some of these oils. In this way it was found that absorption of certain drugs through the skin could be facilitated by dissolving them in the volatile oils. The investigation is still in progress. It is planned to study not only the volatile oils themselves but their various chemical constituents, and it is hoped that in this way some effective vehicle for carrying medicaments through the intact skin may be discovered."

Edward Kremers commented, in part, that in their physiological action, terpenes may act not as hydrocarbons as they are commonly regarded, but as unstable peroxides into which they are readily converted in part by atmospheric oxygen.

The next paper read was "The Stabilization of Syrup of Ferrous Iodide, U. S. P. X," by William J. Husa and Lyell J. Klotz. It was discussed by Arthur Osol, H. V. Arny, H. K. Mulford and John C. Krantz, Jr., and the author.

Replying to Dr. Osol, the author explained the method of determining the hydrolytic constants of ferrous iodide. The effect of sunlight on color changes in the syrup was discussed by Dr. Arny. In reply to a question by Dr. Krantz as to whether the preservative effect might be a function of the molar concentration of the dextrose or other sugar, Dr. Husa pointed out that in the syrups containing hypophosphorous acid, free iodine could not appear; hence, dextrose was not to be considered as a preservative but merely as a substance giving the solution the properties of sweetness and viscosity characteristic of syrups. H. K. Mulford asked whether the effect of ultraviolet light had been studied. In response, Dr. Husa stated that ultraviolet light does not hasten the decomposition of hydriodic acid, but that all parts of the visible spectrum do.

The next paper, "Drug Extraction. I. A Study of Various Menstrua from the Standpoint of Swelling Effects, Penetration and Extraction," by William J. Husa and Louis Magid was presented by Dr. Husa. It was discussed by Messrs. M. W. Quimby, J. C. Krantz, Jr., H. V. Arny and the author. Mr. Quimby asked whether the effect of the age of the vegetable tissues on the swelling properties had been considered, to which the author replied in the affirmative. In regard to the results on extraction of drug powders of various degrees of fineness, Dr. Krantz asked whether it was planned to work with powders of colloidal size. Dr. Husa replied that the work had been carried out on Nos. 20, 40, 60 and 80 powders of the U. S. P. and that when the fineness of powder reached a certain stage there was a decrease in efficiency of extraction due to adsorption of constituents by the greatly increased surface of the finer particles. Dr. H. V. Arny stated that the section had just listened to a historic paper. Speaking as Chairman of the A. PH. A. Committee on Research, Dr. Arny pointed out that the research grants to Dr. Husa marked a departure from former policies in that the awards were for specific research on drug extraction which would take more than one year for completion. He pointed out the valuable services of W. L. Scoville in urging that a truly scientific study of drug extraction should be sponsored by the A. PH. A. and in making plans for the scope of the work. Dr. Arny stated that the drug extraction research had been in progress for two years and that he hoped the grant would be made to Dr. Husa for another year. In conclusion Dr. Arny said that he wished all of those present could have followed the progress of the work month by month as given in the detailed monthly reports submitted by Dr. Husa to the sub-committee of five appointed to keep in touch with the work.

The next paper, "Investigation of Gleditschia Triacanthos," was read by Y. T. Oester.

In presenting the next paper on "Further Studies on Psyllium," the Chairman stated that other papers by the same author had appeared in the JOURNAL OF THE A. PH. A. (No discussion.)

The next paper entitled, "Chemical Examination of Urographic Preparations," was read by George W. Collins. (No discussion.)

The following papers were read: "A Continuous Reading Titration Apparatus," by L. H. Baldinger; and "Is Iris Versicolor, N. F. V Adulterated?" by George M. Hocking. (No discussion.)

The First Session of the Scientific Section was then adjourned.

SECOND SESSION.

The Second Session of the Scientific Section was convened by Chairman F. E. Bibbins, May 10th, at 9:30 A.M. The reading of papers was continued.

The first paper, "Some Observations on the Stability of Quinine Sulphate during Storage," by L. E. Warren, was read.

The three following papers were read by Horatio Wales: "The Water of Crystallization of Quinine Sulphate;" "The Water of Crystallization of Codeine Phosphate;" "The Water of Crystallization of Emetine Hydrochloride." These were discussed by the author, John C. Krantz, Jr., and L. E. Warren.

The following papers were read: "Some Considerations of Silver Picrate," by John C. Bird and Alfred Barol. (No discussion.)

An illustrated paper, "The Metabolism of Dulcitol and Dulcitan," by C. Jelleff Carr and John C. Krantz, Jr.

"The Effect of Isomannide on the Liver-Glycogen of the White Rat," by C. Jelleff Carr and John C. Krantz, Jr., was read by William Evans.

C. Jelleff Carr referred to work reported at the Madison meeting on the metabolism of mannitol and mannitan. The studies have been continued, using dulcitol and dulcitan. The compounds are interesting from the standpoint of their metabolism and because of their relationship to the widely used and important substances, glucose and mannitol. In explaining the first slide, the author stated that dulcitol is an interesting compound; apparently no one has investigated it biologically; one of the reasons may be its cost. It is used in bacteriological work. The author explained the method employed in its preparation and the use they have made of it.

William Evans said that no report on the metabolism of isomannide had been found in literature; it was found that mannitol increased the blood sugar but did not affect the respiratory quotient. Mannitan showed increase in the respiratory quotient but no rise in blood sugar. Berthelet's method was used to separate the isomannide from mannitol.

In feeding the rats a mixture of cacao butter and isomannide was used. The liver-glycogen obtained from these determinations indicates that the per cent was 41, compared with the normal. In the experiments in which isomannide was administered by the stomach tube, rats were fasted for 48 hours and then given one Gm. of isomannide and in these determinations the average per cent was 0.33 compared with 0.14 in the normal. In feeding experiments the tissue liver-glycogen was 700 per cent, compared with 1200 per cent in the normal, indicating a relationship. The respiratory quotients obtained were slightly lower than those of fasting animals; administering 4 cc. of a 50 per cent solution of isomannide, there was a slight lowering of the respiratory quotient and somewhat less oxygen consumption. Experiments showed that isomannide indicates that it is not a normal food in the body. Toxicity experiments showed no toxic effects—the amount administered per 100 Gm. of rat was 1 Gm., 1.5 Gm., 1.5 Gm. and 5 doses of 2 Gm. Further remarks are deferred to the publication of the papers.

The next paper, "The Chemical Assay of Adonis, Convallaria and Apocynum," was presented by James C. Munch.

James C. Munch presented "Saliva Tests. I. Morphine." The paper was discussed by the author, Dr. Penniman, and F. A. Upsher Smith. (Discussion will accompany the paper.)

The next paper presented was "A Study of the Physical and Chemical Properties of a Number of Specimens of Calomel of American and European Manufacture," by Charles H. LaWall and J. W. E. Harrisson. (No discussion.)

"An Experimental Study of the Assay of Citrine Ointment," by Thomas G. Wright was next in order. (No discussion.)

The next paper, "The Active Constituents of Ergot: A Pharmacological and Chemical Study," by Marvin R. Thompson, was presented.

In discussing the paper by M. R. Thompson on "The Active Constituents of Ergot," John C. Krantz, Jr., inquired whether the drug portion in the test-tube shown during the reading of the paper, was devoid of all activity. The author replied that it was devoid of all significant activity.

E. E. Swanson inquired whether the liquid was an extraction of the new principle. The author replied that it was; that every possible type of extract except that obtained by the use of petroleum ether changed the new alkaloid. He stated that through the kindness of Dr. A. K.

Hoff of Johns Hopkins University clinical confirmation was given of the pharmacological results that had been obtained. His observations have been confirmed upon humans by the use of a technique similar to that employed by Moir in England.

L. W. Rowe inquired relative to the stability of the new principle. The author replied that he could say nothing very definite but observations indicate that the alkaloid is quite stable. From observations upon crude extracts it seems that the prompt type of activity provides in these preparations for a much longer period than the whole individual delayed type of activity from ergotoxine and ergotamine.

James C. Munch inquired whether this new product affects the coxcomb method of assay. The author replied that the currently accepted bioassay methods should be chosen purely with respect to accuracy and dependability, since the new alkaloid as well as ergotoxine or ergotamine is measured by the currently accepted methods including the colorimetric method of Smith. None of these methods can distinguish the new from the old type of alkaloid. It is for that reason that he was led to the conclusion some years ago that ergotoxine or ergotamine was completely representative of the drug itself. The currently accepted methods can be made to serve as a means of insuring standardized amounts of oxytocic activity in crude ergot extracts.

Dr. M. I. Smith of the U. S. Public Health Service said that Dr. Thompson in replying to Dr. Munch stated that the new principle also gives the typical coxcomb reaction and epinephrine reversal reaction the same way as the old ergotoxine or ergotamine. If that statement is correct it should be possible to have some means of evaluating the extracts. It seems to him that there is now quite a little work which has been published indicating that ergot activity is measured by the well-known pharmacological methods, referring especially to the work of Clark some ten years ago. He wondered if these apparent discrepancies could be reconciled.

The author replied that one is not justified in assuming that aqueous extracts are all free from alkaloid. If the figures are examined that have been published in the literature it will be found that especially with the coxcomb method, the extracts are usually stated to be less than 25% of official potency requirements. He had found that all reasonably good aqueous preparations of ergot similar to those used by Moir on humans, had taken the amount of alkaloid which would provide 0.2 to 3.2 mg. in doses of the size used by Moir. The new alkaloid shows intense activity upon the human in a dose of one mg. and therefore there is no real conflict of figures in an accurately determined alkaloid equivalent in these preparations.

The next order of business was the report of the Committee on the Chairman's Address. Secretary L. W. Rowe presided. Glenn L. Jenkins reported for the Committee, as follows:

"Our Committee highly commends the Chairman upon his excellent address. We recommend that the work of the Committee on Monographs be continued. We further recommend that the Scientific Section request a grant of a sum of money to cover in part or in whole the cost of printing the monograph on aconite from the Committee on Research of the AMERICAN PHARMACEUTICAL ASSOCIATION, if it is necessary.

"We approve the recommendation of the Chairman that Chapter 9, Article VIII of our By-Laws be amended to read as follows: 'All papers, which shall be in duplicate, and reports presented to the Section become the property of the ASSOCIATION; one copy of the papers and of the reports shall be forwarded to the Editor of the JOURNAL immediately following the annual meeting of the Section; the other copy of the papers shall be submitted to the Chairman of the Committee on Ebert Prize by the Secretary of the Section.'"

On motion the report was adopted.

The reading of papers was continued, as follows:

"The Bioassay of Squill Preparations," by Harry Rosen.

"The Guinea Pig as an Hematopoietic Test Animal. (A Preliminary Report)," by J. W. Landsberg and Marvin R. Thompson. (No discussion.)

"Deterioration and Stabilization of Aconite Preparations," by William B. Baker.

James C. Munch was surprised to learn that aconite deteriorates so rapidly. He had made considerable commercial experiments with it. He wanted to know something about the storage conditions. The author replied that on account of the shortness of time it was impossible to go into details, but the identification of aconite was made. At the present time the results presented are mostly a confirmation of the work of E. E. Swanson. The surroundings in which

the bottles were kept were the average room conditions as far as light and temperature conditions are concerned.

E. E. Swanson stated that since the recent studies of aconite he had come to the conclusion that there should be a control for the standardization of aconite. For example, the results in different laboratories and the animal variation is quite striking and he, therefore, thought that there should be a control of a standard.

M. R. Thompson stated that the standard aconitine was used throughout this study as a control. Standard aconitine prepared by recrystallization from alcohol and selected *in vacuo* had been used over a period of about three years.

The following papers were read, on which there was no discussion: "The Rectal Absorption of Digitalis in Cats," by W. Arthur Purdum; "The Bioassay of the Anterior Pituitary-Like Sex Hormone," by L. W. Rowe, A. Simond and W. O. Nelson; and "Alkaloid Reagents. VII. Thallium," by James C. Munch and Justus C. Ward.

The Second Session of the Scientific Section was then adjourned.

THIRD SESSION.

The Third Session of the Scientific Section of the AMERICAN PHARMACEUTICAL ASSOCIATION was convened on May 11th, at 2:15 P.M. by Chairman F. E. Bibbins.

The following paper was read and discussed: "The Comparative Antiseptic Action of Ointments and Related Products," by Arthur H. Bryan.

The following papers were read by title:" The Determination of Alcohol in Chloroform," by George D. Beal and Chester R. Szalkowski. "The Specific Gravity of Oil of Theobroma," by George D. Beal and Chester R. Szalkowski. "The Detection of Rosin in Balsams," by George D. Beal and Chester R. Szalkowski. "The Gravimetric Determination of Camphor," by George D. Beal and Chester R. Szalkowski.

The following papers were read. (No discussion.) "A Note on the Arsenic Determination for Reduced Iron," by Margarethe Oakley and John C. Krantz, Jr. "A Note on the Assay of Reduced Iron," by Margarethe Oakley and John C. Krantz, Jr.

"Drug Extraction. II. The Effect of Fineness of Powder and of Variation in Solvents on the Percolation of Belladonna Root," by W. J. Husa and C. L. Huyck.

"Drug Extraction. III. The Function of Preliminary Maceration in Relation to the Percolation of Belladonna Root," by W. J. Husa and S. B. Yates.

"Drug Extraction. IV. The Effect of Variation in Solvents on the Extraction of Jalap," by W. J. Husa and Paul Fehder.

(The foregoing papers were discussed; the discussions will accompany the publication of them.)

The following papers were read and discussed. (Discussions will accompany the papers.) "Pharmaceutical Applications of a Quantitative Barbiturate Test," by James M. Dille. "Insulin Studies. I. The Effect of Insulin on the Blood Sugar of Mice," by James C. Munch and Amelia M. Ponce. "Pharmacognosy and Pharmacology of Ouari Nuts," by William J. Stoneback, Harry J. Pratt and James C. Munch.

The following papers were read by title: "Brom Alkyl Derivatives of Salicylic Acid," by E. Moness and W. G. Christiansen. "An Attempt to Ketonize Ergosterol," by E. Moness and W. G. Christiansen. "Sulfide Analogues of Azo Dyes Having Bactericidal Properties," W. Braker and W. G. Christiansen. "Barbituric Acids and Structural Analogue," by W. Braker, T. B. Grave and W. G. Christiansen.

The following papers were read and discussed: "The Potentiation of the Action of Strychnine by the Use of Various Drugs," by D. A. Spencer, J. C. Ward and F. E. Garlough. "The Pharmacology of Galinsoga—a Series of Micro-Respirometer Studies," by Martin A. Yavorsky and Edward C. Reif. "U. S. P. Standard for Digitalis," by F. A. Upsher Smith. "A Comparative Study of Absorbability of Seven Calcium Compounds," by A. Richard Bliss, Jr., and Robert W. Morrison. "The Physiological Action of Synthetic *vs.* Natural Camphor," by B. V. Christensen and H. J. Lynch. "Laboratory Notes on the Stabilization of Fluid Extract of Ergot," by Elmer H. Stuart and Francis E. Bibbins. "Free Alkalinity in Glass," by L. F. Gabel.

The following papers were read by title: "The Effect of Altitude on the Action of Strych-

nine," by A. W. Moore and J. C. Ward. "The Preparation of Chrysophanic Acid from Chrysarobin," by John H. Gardner. "A Note on the U. S. P. Monograph on Chrysarobin," by John H. Gardner. "Characteristic Tests and General Group Reactions for a Number of the Better Known Hypnotic Drugs," by Charles W. Bauer.

The Committee on Nominations reported, naming the following nominees: *Chairman*, E. V. Lynn; *First Vice-Chairman*, H. M. Burlage; *Second Vice-Chairman*, R. E. Schoetzow; *Secretary*, F. E. Bibbins; *Delegate to the House of Delegates*, L. W. Rowe.

James C. Munch presided; Chairman E. E. Swanson presented the report. On motion of John C. Krantz, Jr., and a second, the chairman of the Committee on Nominations was directed to cast a unanimous ballot for the nominees.

A vote of thanks was given the retiring secretary, L. W. Rowe, for his efficient services during the past six years.

Under Unfinished Business the amendment embodied in the President's address, relating to Chapter IX, Article VIII of the Scientific Section, was re-read; on motion by F. F. Berg and a second the amendment was adopted.

Frederick Greenbaum made a number of suggestions relative to arrangement of papers and the program. He was of the opinion that 10 minutes should be allowed for presentation of papers; that only members should present papers and their connections should be given on the back of the papers presented. He favored more discussion of papers; papers submitted by titles should be placed at the end of the program.

Chairman Bibbins thanked Dr. Greenbaum for his suggestions and stated that a number of them had been under consideration; the attendance varies from year to year and some are not familiar with the order of program.

John C. Krantz thought the suggestions made should be sent to the Committee on Review of Papers. He also made a motion to the effect that the Committee on Review of Papers be given the power to suggest to the Editor of the JOURNAL the form according to which all scientific articles published in the JOURNAL should be in accordance, and when this form has been selected that it be printed on the lower half of the inside of the second cover page of the JOURNAL. He was of the opinion that there should be a uniform style in the JOURNAL.

The Editor stated he would be glad to have the suggestions made and to coöperate with the Committee.

Chairman Bibbins expressed appreciation of serving and thanked the members for co-operation.

The officers were duly installed and they thanked the members for the honors conferred.

(The Editor will confer with the Secretary relative to papers that may have been omitted, if any.)

The meeting was, on motion duly made and seconded, adjourned.

JOINT SESSION SCIENTIFIC SECTION AND SECTION ON PRACTICAL PHARMACY AND DISPENSING.

The Joint Session of the Scientific Section and the Section on Practical Pharmacy and Dispensing was called to order by Chairman of the Scientific Section, May 10th, at 8:30 P.M. Chairman Marvin J. Andrews, of the Section on Practical Pharmacy and Dispensing, presided as Co-Chairman.

The first report called for was on The United States Pharmacopœia and presented by Chairman E. Fullerton Cook. (To be printed in these minutes or under Committee Reports.) Motion was made that authority be granted to release the report and thereafter by a motion, duly seconded, it was received.

The report of the Committee on National Formulary was called for. (It is printed in the May JOURNAL, A. PH. A., page 513.)

E. Fullerton Cook said that the revision work on the National Formulary had gone aggressively forward. It will be a book in which pharmacists may have pride. The report was received.

The report on the Pharmaceutical Recipe Book, J. Leon Lascoff, Chairman, was read and accepted. (It is printed in the May JOURNAL, pages 508–510.)

The next item of the program was the report of the Committee on Glass Standardization. The report was read by Ralph E. Terry; it covers the third and fourth years of research on the deterioration of chemicals and pharmaceuticals when stored in colored glass containers. (It is published in this issue of the JOURNAL under the title "Deterioration of Certain Medicaments under the Influence of Light," by H. V. Arny, A. Taub and R. H. Blythe.) The report was accepted.

The report of the Committee on Ebert Prize was read by Secretary Rowe and accepted. It follows:

REPORT OF THE COMMITTEE ON THE EBERT PRIZE.

Mr. Chairman and Members of the Scientific Section of the American Pharmaceutical Association:

One member of the Committee on the Ebert Prize Award is not in attendance at the meeting of the ASSOCIATION and has not responded to the request of the Chairman for a written report on the evaluation of the papers read at the Scientific Section of the meeting at Madison. The Chairman of the Scientific Section, therefore, appointed another member of the ASSOCIATION to serve on the Committee of Award.

All papers read at the Madison meeting of the Scientific Section, both published and unpublished, have been considered. It is the unanimous opinion of the Committee that no paper is of such outstanding merit as to be worthy of the award of the Ebert Prize. Therefore the Committee recommends that the award be not made this year.

(Signed) F. F. BERG,
E. E. SWANSON,
L. E. WARREN, *Chairman.*

The report of the Committee on Monographs was read. It follows:

REPORT OF THE COMMITTEE ON MONOGRAPHS.

After several years of careful work the monograph on aconite is nearing completion. This monograph in book form will represent more than five hundred pages, counting of chapters on the botany, pharmacognosy, chemistry, pharmacology, toxicology and clinical study of aconite. The monograph consists of numerous illustrations of aconite plants, roots and histological figures.

Following the final corrections, vitamins and compiling of chapters the monograph on aconite will be turned over to the Chairman of the Scientific Section.

The committee is now giving thought and careful consideration on the next subject for monograph study.

(Signed) HEBER W. YOUNGKEN,
JAMES C. MUNCH,
WILLIAM J. HUSA,
C. J. ZUFALL,
E. E. SWANSON, *Chairman.*

E. Fullerton Cook moved the acceptance of the report with appreciation of the work; duly seconded and carried.

The following papers were read and discussed: "Determination of the Reasonable or Permissible Margin of Error in Dispensing. III. Suppositories," and the "Determination of the Reasonable or Permissible Margin of Error in Dispensing. IV. Pills," by Marvin J. Andrews. In reply to a question, the author stated that the question of deviation is a difficult one. The work contemplated was the determination of weight and volume and this line has been followed. The checking of amount of active ingredient contained in a prescription should be done by State Health Departments throughout the country and this will require work extending over a period of years.

There being no further business, the Joint Session was adjourned.

SECTION ON PRACTICAL PHARMACY AND DISPENSING.

The First Session of the Section on Practical Pharmacy and Dispensing was called to order by Chairman Marvin J. Andrews, May 10th, at 9:00 P.M. Vice-Chairman Ralph W. Clark presided during the reading of the Chairman's Address. It follows:

ADDRESS OF THE CHAIRMAN.

BY MARVIN J. ANDREWS.

As Chairman of the Section on Practical Pharmacy and Dispensing, it is my pleasant duty to welcome you to all the sessions to be held by this Section, and we hope you will find these meetings inspiring so that you carry home with you some valuable information as well as a most gratifying list of new acquaintances.

The opinion of the Chairman is that a new day has arrived for the Section on Practical Pharmacy and Dispensing with the completion of the new headquarters building of the AMERICAN PHARMACEUTICAL ASSOCIATION, "The American Institute of Pharmacy," and I deem it a great privilege to have acted as your Chairman during the past year. As history usually repeats itself, it may be well to review the outlook of Pharmacy at the time this section was formed, some thirty-four years ago.

The committee's first report was presented by its chairman, Dr. Henry P. Hynson, on the afternoon of September 5, 1899. The Committee on Practical Pharmacy and Dispensing had been formed because of the waning interest of the practicing pharmacist in the affairs of the ASSOCIATION. At its inception, the Committeee had as its purpose, to interest the retailer and to draw from him some of his rich store of information, which daily experience and actual demand had given him. To obtain the material necessary to form this section, the work was divided between several persons and over 1000 members were interrogated by means of circular letters, personal contacts, etc. It was noted, with interest, that the number of replies to the written communications was small, yet the Committee was not discouraged and the section was formed.

We have often heard that pharmacy is not what it was in the good old days, and since this section was formed before your present Chairman was born, it seems fitting that he should quote parts of the first address and show that the section is in a much better position to-day than it was in days gone by.

Quoting from the address of the first Chairman, we have the following interesting statements: "It has been said that pharmacy has degenerated and that much more was required of the dispenser in the 'good old days' than at present. We deny this and refer specifically to the scientific attainments, ready and comprehensive knowledge, and especially to technique. Three prime facts are brought out—changes have occurred, opportunities for galenical pharmacy still exist, and much dispensing knowledge is required. We do not put up quite so many mixtures, but we make many more solutions, solutions of delicate and sensitive alkaloids which have to be accurately weighed, solutions which have to be made on a percentage basis unknown in the former periods. We make less pills, but we fill more capsules, filled with masses and powders; soft elastic capsules filled with liquids, oils and alcoholics. Ointments require more time, more good judgment than any other class of preparations. You can hide your faults better *anywhere else* than you can in ointments! Tablets have come and in many instances are less trouble than pills or capsules. Even a plaster must be spread occasionally, if not in a 1000 times, then once in 5000 times. That *proprietaries* have increased is, indeed, a truth. The 'good old days' show badly as compared with these 'hard times'—the pricing of prescriptions is not a matter of individual caprice—we will invariably charge all that competition will allow—no more, no less. Beyond and above all items, the most encouraging fact established, is that galenicals such as can be prepared by a competent pharmacist are still used."

The first committee suggested "The Dispensary and Laboratory should be away from the public and apart from the sales department, yet the two should be close together. Apparatus and facilities should be plentiful. Containers should be of sufficient variety and should be attractive." In conclusion, Dr. Hynson made the following statement: "Not from without, but from within, does pharmacy need help—help that is practical."

It may have been unwise to take up so much of your time in briefly recalling the outstanding points of the first Chairman's report, but it will at least remind us that the same problems that our predecessors had to face are with us today, and to point out more forcibly that we, as leaders in professional pharmacy, should look forward with hope for the future of pharmacy, and allow the "good old days" to remain as history.

With the dedication of the American Institute of Pharmacy, all who are in any way connected with our profession can look forward with pride to telling all classes of people, that the

home of American Pharmacy is located in one of the most beautiful spots in our National Capital. After a long, hard struggle, the dream of having an ideal headquarters building is realized, yet we must all remember that *the future of our profession does not rest upon a beautiful building*, but that *it depends upon the coöperation of those interested in the advancement of pharmacy.*

Since the formation of the American Association of Colleges of Pharmacy the standards of education in pharmacy have been steadily advanced. The graduates in pharmacy to-day receive an academic degree that is on a par with all other educational institutions. With this active association we can rest assured that the educational requirements will be advanced to meet the professional demands of the future.

The Section on Practical Pharmacy and Dispensing is primarily interested in the advancement of professional pharmacy which is accomplished through the following groups: (1) recognized schools of pharmacy, (2) hospital pharmacists, (3) retail pharmacists, and (4) manufacturing pharmacists. It is my personal opinion that with the foregoing sources of obtaining information, this Section should be the outstanding section in the AMERICAN PHARMACEUTICAL ASSOCIATION or in any other association, for the advancement of professional pharmacy. This will be the case provided those members who are interested in our work will give a few hours of their time in preparing papers or offering suggestions to the officers of the section. The success will also depend upon the willingness of all future officers to do their share in making their meeting the outstanding meeting in our history.

ACCOMPLISHMENT OF OFFICERS FOR THE PAST YEAR.

Although this has been a short year to accomplish a great deal, it is with pleasure that your officers report progress since our last meeting. Immediately after the sessions held in Madison, the officers began preparing a mailing list, which was to be used in an endeavor to stimulate interest in our section. As a starting point, we selected the schools that hold membership in the American Association of Colleges of Pharmacy. The first step in our program was to obtain catalogs from every school in this Association, and from these catalogs obtain the names of every person engaged in teaching either galenical, dispensing, manufacturing or hospital pharmacy. With this list, we then obtained from the issues of the JOURNAL of the AMERICAN PHARMACEUTICAL ASSOCIATION, the official programs presented before this section since 1920. With this information we then compiled our mailing list according to states. This completed list gives the name and address of each school holding membership in the American Association of Colleges of Pharmacy, the pharmacy teaching staff of the respective schools, and the titles of the papers presented by each member of the pharmacy teaching staff before the Section on Practical Pharmacy and Dispensing according to the year presented, since 1920.

This list reveals some very interesting facts; foremost of all, is that out of a total of 57 schools holding membership, only 29 have presented papers before our section since 1920. Out of a possible 211 teachers (professors, instructors and laboratory assistants) of galenical, dispensing, hospital or manufacturing pharmacy, only 49 have taken an active part during some of our meetings since 1920.

We may well ask ourselves the following question: Is this lack of interest due to the programs presented before our section, or to the schools and their pharmacy teaching staffs? I prefer to think it is not caused by a lack of interest, but is probably due first, to the known fact that a great many people are timid and are afraid to write papers, for fear they may be criticized; and second, to a want of encouragement on the part of the officers of our section. The old worn out excuse that we do not have time to prepare a paper sometime during a period of five years is a direct admission that the members of that particular pharmacy teaching staff are overworked or are lazy. It is always well to remember, "Where there is a will there is always a way," and it is up to the officers of our Section to encourage that will.

In addition to the above, we have also prepared a list of hospital pharmacists, manufacturing pharmacists and retail pharmacists who should be interested in our section and we have invited each and every one to take an active part in the program this year. A study of our program will show that we have been successful in interesting several newcomers in our section.

The program for the 1934 meeting has been arranged so that Friday afternoon may be devoted entirely to Professional Pharmacy. We have included on this part of our program, the papers dealing with hospital pharmacy, dental pharmacy and a majority of the papers dealing

with strictly professional pharmacy. It is hoped that you will remain with us during both sessions.

SUGGESTIONS FOR FUTURE OFFICERS OF THIS SECTION.

In order for our section to progress in the future it will be necessary for the officers to adopt a definite program and see that the program is carried out until it is completed. Very little will be accomplished if a great number of projects are started, without a long and tedious follow-up plan. If you, as future officers become discouraged in performing your duties, don't give up, just remember that anything that is worth while is worth working for. With this spirit continued for a period of five or ten years every one will look to our Section with pride.

In order that our activities will advance in the future, we recommend that if you are selected as an officer for the Section on Practical Pharmacy and Dispensing, do not accept the office unless you are willing to do your share in the work to be performed. Your name appearing on the stationery will be an asset to the section if you work, or a liability, if you let every one else do the work and you try to take the credit. Coöperation and team work are essential in any organization.

Obtaining Papers.—The officers for the past year have tried to encourage papers of *pharmaceutical interest* and have endeavored to refer the papers that should be presented before the Scientific Section to that section. A mimeographed copy of Chapter IX of the By-Laws of our Section, accompanied each request for papers. An invitation was extended to the younger members of the pharmaceutical profession as well as to our older friends. It is hoped that the incoming officers will continue to follow this procedure.

Types of Papers That Should Be Presented before the Section on Practical and Dispensing Pharmacy.—Papers of real pharmaceutical and practical value can be prepared on the following subjects. (1) *Professional Pharmacy*—(*a*) The successful operation of professional pharmacies; (*b*) publicity, which may include the professional relationship committees, the U. S. P. and N. F. publicity committees, or any individual or collective methods of placing retail pharmacy on a higher plane. (2) *U. S. P. and N. F. Preparations*—Suggested improvements for the now existing formulas and the devising of suitable formulas for the simples contained in the U. S. P. or N. F. which may be adopted in the future. (3) *Prescription Tolerances*—This topic is large enough for every one in the section to work on for three or four years, and still leave a great many phases to be worked out. In pharmacy we need definite standards of this type, which are now lacking. (4) *Incompatibilities*—A detailed study should be made of the incompatibilities of the individual simples or preparations contained in the U. S. P. and N. F. and in addition, the more important newer remedies. (5) *Drug Extraction*—This alone is an endless field for research. The above are only a few of the many problems that can be reported in papers before this section.

Membership in the American Pharmaceutical Association.—The officers as well as the members should endeavor to increase the membership in the ASSOCIATION. Every person connected with the teaching staffs of our pharmacy schools specializing in any branch of pharmacy should be a member. Membership among hospital pharmacists, manufacturing pharmacists and retail pharmacists should be encouraged.

Newly Elected Officers.—It is suggested that the chairman divide the work to be accomplished for the year, and assign each officer a definite task to perform. If the under officers perform their task well and prove that they are assets to the section, they should be advanced; if not, they should be replaced.

RECOMMENDATIONS.

1. It is recommended that the nominating committee comply with the by-laws of our Section, and nominate a second vice-chairman. This office has been vacant since 1928.

2. It is recommended that a detailed report of the Committee on Prescription Tolerances be presented before the First Session of the Section on Practical Pharmacy and Dispensing each year until definite standards have been established. It is further recommended that the President of the AMERICAN PHARMACEUTICAL ASSOCIATION in making the appointments to this committee, include, both the Chairman and Secretary of the Section on Practical Pharmacy and Dispensing either as associate or active members of this committee.

3. It is recommended that the Section on Practical Pharmacy and Dispensing request the Council of the AMERICAN PHARMACEUTICAL ASSOCIATION to appropriate an additional $50

for our Section. This additional $50 to be used in collecting and correlating all propaganda that has been used in the various cities and states in this country for promoting professional pharmacy. This propaganda will include the work of Interprofessional Committees, U. S. P. and N. F. Publicity Committees, Hospital Formularies, etc. The purpose of this information is not for the AMERICAN PHARMACEUTICAL ASSOCIATION to carry on an expensive publicity campaign, but to assimilate data which will act as a guide for the various state and city associations that are interested in work of this nature.

CONCLUSION.

In conclusion, I wish to express my sincere thanks to Secretary Ralph E. Terry, Vice-Chairman Ralph W. Clark, Delegate L. W. Rising and to all other members of this Section who have coöperated with me in promoting the activities carried on by this group during the past year.

Acting Chairman Clark commented favorably on the address and appointed as a Committee on Resolutions to whom the address was referred: *Chairman* L. Wait Rising, Leon Richards and H. M. Burlage.

The following were appointed members of the Committee on Nominations: *Chairman* W. G. Crockett, J. W. Rose and J. L. Hayman.

It was suggested by L. M. Kantner that the Chairman should hold office for another year. The views were concurred in by J. Leon Lascoff and others.

REPORT OF THE SECRETARY.

BY R. E. TERRY.

Mr. Chairman, Ladies and Gentlemen:

Again it becomes necessary for the Secretary of this Section to render a report of his activities for the past year. In the first place, unfortunately, it has not been a full year since the last meeting; this fact has been mitigated to some extent by the ready response the officers secured to their calls for papers. The list as presented will tell more of the story of what has been accomplished than any sort of a detailed report.

On the Secretary's part, the solicitation was carried out by means of personal letters. This made it necessary to limit the number solicited, and while it is a rather large job, the results warranted the effort. A very high percentage of returns was secured in this manner.

The Chairman carried a goodly part of the load, however, and it is through his endeavors, that the program is as well balanced as it is. It was through his enthusiasm and labors that a number of new contributors was secured, and the Secretary wishes to pay tribute to the energy and activity of Professor Andrews.

The only recommendation the Secretary wishes to make is to suggest to his successor that the practice of asking all who attend sessions of this Section to register in the book started at Madison last year be carried out. This practice, if continued, will give the Section a valuable historical volume of signatures. It also offers a means of acquainting the officers with those attending and helps to knit the Section together.

Again the Secretary wishes to acknowledge the help given him by the Chairman, and to thank those present who have contributed papers at these sessions.

The report of the Secretary was accepted.

The report of the Committee on Prescription Tolerances was read by Chairman Hugo H. Schaefer. The Chairman stated that this report be made an annual feature. (To be published with discussions under Committee Reports in a succeeding issue of the JOURNAL.)

William F. Reindollar stated that he was very much interested in the report and particularly the part on Capsule Tolerance. He said the State Department in Maryland had made experiments to determine the weight of empty capsules and this confirmed the statement of Chairman Schaefer, which was to the effect there is so much variance in the weight of capsules due to air conditions that there is no uniformity.

William J. Husa said this report interested him very much and he referred to the fact that capsuls develop an odor.

Chairman Andrews stated that a paper would be presented on "Hand-Filled Capsules" and further discussion would be deferred until after the presentation of that paper. On motion

duly seconded the report of Chairman Schaefer was accepted. (The report will be published in a succeeding issue of the JOURNAL, and it is hoped to print with it abstract of the discussions which were part of the report of the Committee on Weights and Measures.)

Referring to nominations, Chairman Andrews thought that both he and the Secretary felt they could do more constructive work as members than as officers. He referred to a list of schools of pharmacy, members of which had been very much interested in this Section for a number of years. This Section should be made the outstanding one of this ASSOCIATION.

The following papers were read and accepted: "Accuracy and Speed Factors of Hand-Filled Capsules," by John W. Lee; "Prescription Criticism," by J. A. Reese; "Past, Present and Future in Pharmacy," by L. M. Kantner; "Why Hand-Molded Hypodermic Tablets Vary," by S. W. Bower.

J. Leon Lascoff inquired whether capsules filled by hand were more accurate than those filled by machine. The author had made no comparisons. William Gray said he had little trouble with variations in the weight of capsules.

The other papers were not discussed.

Secretary Terry stated that those who desired could have abstracts of papers. (The JOURNAL has a few of the abstracts for those who desire copies, if they will address the JOURNAL office.) Chairman Andrews referred to a display of foreign prescriptions by J. Leon Lascoff. (These prescriptions were donated to the American Institute of Pharmacy and with them a key translation.)

Reading of papers was proceeded with as follows:

"Studies on Bismuth Subsalicylate," by Wm. F. Reindollar.

"The Problems of the Teachers and the State Board Examiners of Practical Pharmacy and Dispensing," by Harry W. Mantz.

"The Stabilization of Syrup of Hydriodic Acid, U. S. P. X," by William J. Husa and L. J. Klotz.

"A Method for the Preparation of Parenteral Dextrose Solutions," by H. A. K. Whitney.

Chairman Andrews announced that he would place this paper under "Hospital Pharmacy." He said there were four or five papers belonging under that sub-head.

Reading of papers was continued.

"A Suggested Formula for White Liniment," by L. H. Baldinger.

"Shark Liver Oil," by W. S. Jones and W. G. Christiansen.

"An Enteric Coating for Tablets," by Harold A. Johnson and Ralph W. Clark.

Chairman Andrews announced that the next meeting would be a Joint Meeting with the Scientific Section and that the Second Session would be held on the next afternoon.

It was announced that a paper by F. W. Nitardy, not on the program, would be read on "How Much Is a Teaspoonful?"

H. Evert Kendig suggested that in view of the fact that the number of papers is increasing, instead of being read they should be presented in abstract so as to provide for more discussion. The number of papers read in full permitted only very brief discussions, and this is helpful.

The First Session of the Section on Practical Pharmacy and Dispensing was adjourned. (The Program of the Joint session with the Scientific Section is reported in connection with the minutes of the latter.)

SECOND SESSION.

The Second Session of the Section on Practical Pharmacy and Dispensing was convened at 2:00 P.M., May 11th, by Chairman M. J. Andrews. The reading of papers was proceeded with.

"The Place of a Field Representative in Coöperative Professional Advertising," by L. Wait Rising. (No discussion.)

The Committee on Chairman's Address presented the following report:

It was not considered necessary to act on the recommendation of the Chairman relative to nominating a *Second Vice-Chairman* as that is provided for in the By-Laws.

It was recommended that a detailed report of the Committee on Prescription Tolerances be presented before the First Session of the Section on Practical Pharmacy and Dispensing each year until definite standards have been established and it was recommended that the President of the AMERICAN PHARMACEUTICAL ASSOCIATION, in making appointments to this Committee, to include

both the *Chairman* and the *Secretary* of the Section as associate or active members of this Committee. The recommendation was presented in this way. "It is recommended that a detailed report of the Committee on Prescription Tolerances be presented before the First Session of the Section on Practical Pharmacy and Dispensing each year until definite standards have been established and they recommended further that the President of the AMERICAN PHARMACEUTICAL ASSOCIATION in making appointments to this Committee include both the *Chairman* and the *Secretary* of the Section on Practical Pharmacy as associate members of the Committee."

These recommendations were approved.

The Committee recommended further that the Section on Practical Pharmacy and Dispensing request the Council of the A. PH. A. to appropriate an additional $50 for the Section which is to be used in collecting and correlating all propaganda that has been used in various cities and states for promoting professional pharmacy. This propaganda will include the work of interprofessional committees on U. S. P., N. F. Publicity Committees, Hospital Formulas, etc. The purpose is to provide data as a guide for various state and city associations interested in this kind of work.

The Committee presented the recommendation in this form, that $50 be appropriated by the Council of the A. PH. A. for the purposes indicated.

The recommendation was adopted.

Chairman Rising said the Committee would like to suggest that inasmuch as the Section on Education and Legislation has considered a somewhat similar undertaking it would be invited to proceed in a coöperative plan.

The recommendation was adopted.

Chairman Andrews stated that it would be necessary to make a change in the program. The first report was by R. W. Clark, "A Report on Interprofessional Relationship Work in Wisconsin." This article is printed in the *Wisconsin Druggist* for January and an editorial appears in the *Wisconsin Medical Journal*.

The next paper presented was by F. W. Nitardy, "How Much Is a Teaspoonful?"

The author had presented the paper, because the public is in the habit of using the teaspoon as a measure of dosage.

On motion of I. A. Becker and a second by Aquilla Jackson, the paper was referred to the U. S. P. and N. F. Revision Committees for consideration. There was some further discussion and the motion made was adopted.

Chairman Andrews requested that all members sign the official roster.

Reading of papers was continued.

"Problems in Dental Pharmacy," by A. O. Mickelsen.

"Pharmaceutical Possibilities of Dental Supplies," by Leon Richards.

Secretary Terry referred to a convention of dentists when there were about 4500 dentists in attendance.

The paper as presented was published in the JOURNAL. There was much interest in the subject at this meeting and to such an extent that he had received an invitation to attend the national meeting of the American Dental Association to be held in St. Paul during the first week of August.

Secretary Terry was appointed representative to the meeting in St. Paul.

The foregoing papers were discussed by Frank L. Black, A. O. Mickelson and the authors. The consensus of opinion was that this was a fertile field for pharmacists.

Dr. F. B. Kirby reported on two interesting state meetings which he had attended; one in Oklahoma and one in Kansas, where there was considerable interest manifested showing the growing contact with the dental profession. He stated that at Marquette University, Milwaukee, the dental students are taught to write dental prescriptions and he had been told that in Ann Arbor they also teach students to write prescriptions.

The following papers were read:

"The Successful Application of U. S. P. and N. F. Publicity in a Retail Drug Store," by L. S. Williams.

Chairman Andrews stated that this paper would be turned over to the Committee collecting information for U. S. P. and N. F. publicity.

"Professional and Commercial Pharmacy," by Aquilla Jackson.

"U. S. P. and N. F. Publicity in Maryland," by F. L. Black. The author commented that in Maryland regional meetings were held and papers of this type were on the program. Invariably these meetings prove helpful to those who attend.

"A Professional Pharmacy," by Robert R. Gaw.

"The Extemporaneous Preparation of Intravenous Solutions: Saline and Dextrose," by Robert S. Fuqua.

"Hospital Pharmacy," by Richard D. Franklin.

"Hospital Pharmacy Practice an Innovation," by J. Solin Mordell.

"Analysis of Magnesium Carbonate," by Harold A. Bowers.

"What Evils of the Present Day Are the Contributing Factors to the Destruction of the Professional Side of Pharmacy," by J. B. Tripeny.

"A Professional and Scientific Basis for the Pricing of Prescriptions," by George L. Secord.

"The Phytochemical Study of Canchalgua Panamena," by R. A. Benedetti.

A motion was made and duly seconded that the papers read be received.—Adopted.

The Committee on Nominations reported as follows: For *Chairman*, H. M. Burlage of North Carolina; *Vice-Chairman*, L. W. Rising, Seattle, Wash.; *Second Vice-President*, F. L. Black, Baltimore, Md.; *Secretary*, L. W. Richards, Montana; *Delegate to the House of Delegates*, R. W. Clark, Wisconsin.

On motion duly made, seconded and voted the nominees were elected.

Chairman Andrews thanked the members for their support and the honor of having been elected the presiding officer. He hoped that the interest in professional pharmacy would grow and that the members would support the newly elected officers as he had been supported during the past year.

L. S. Williams remarked that pharmacists in Baltimore are giving more attention to professional pharmacy and that physicians are contacted, all of which is helpful.

W. G. Crockett said it was difficult to compare the results of work of one year with that of another but the program for this year is a most interesting one. He thought that the method of working of one group of officers should be communicated to that of another year, so that advantage can be taken of the work done in the past.

A rising vote of thanks was given the officers and the meeting was adjourned.

SECTION ON EDUCATION AND LEGISLATION.

The First Session of the Section on Education and Legislation was convened by Chairman George C. Schicks, May 9th, at 2:30 P.M.

He regretted to advise that on account of serious illness in the family of Secretary Charles W. Ballard, he would be unable to attend the meeting. He, therefore, requested, W. L. Sampson to act as Secretary. Chairman Schicks stated that there were few papers, so these could be freely discussed; he requested Vice-Chairman O. E. Russell to preside during the reading of his address. It follows:

ADDRESS OF THE CHAIRMAN.

BY GEORGE C. SCHICKS.

A person on the outside, so to speak, may sometimes be in a better position to diagnose medical, dental and pharmaceutical ills than those whose daily contact with them has so altered their perspectives that the symptoms fail to have significance. On the other hand it is sometimes difficult to prescribe even when symptoms point to a definite illness, for complications are not uncommon. Each profession has its own ills, its own problems, but in the last analysis the problems of one profession are not so stangely unlike those of the other. If one attends a meeting of physicians such topics as "Are you headed for the last round-up?", "Dispensary abuses," and so on, are discussed, while dentists are discussing ways and means of overcoming cut-raters in their own ranks.

Physicians have their problems with socialized medicine, hospital out-patient departments, dispensaries and organized medical centers, and the dentist finds that the same inroads are being made into his practice. It has been determined that as high as 73 per cent of the

patients in some hospitals could afford to pay for the services of a private physician but instead accept free treatment.

During the past few years the medical, dental and pharmaceutical professions have taken somewhat independent courses but kindred afflictions eventually foster closer harmony and there is at the present time a definite trend toward the renewal of associations with the consequent realization that mutual helpfulness is desirable.

The basic training of the modern pharmacist is scientific. The present-day college course is so designed that the student not only learns pharmaceutical technique and the composition, preservation and compounding of medicinal products, but it has been enlarged to include such subjects as bacteriology, pathology, biology, physiology and physics. The inclusion of these and kindred subjects was not aimed merely to lengthen the college program but to make the man so trained more valuable scientifically.

Having received his fundamental training and practical experience the graduate pharmacist if he desires to attain any degree of success must continue his study, not necessarily in a college, but he must keep informed concerning scientific research in the fields of medicine, dentistry and pharmacy. He must place himself in a position to give the latest well-founded scientific information to members of allied professions. He must be able to go even further; he must play the rôle of instructor to those seeking information regarding prescription writing, incompatibilities, official drugs and preparations, and new and non-official remedies and accepted dental remedies.

With such a scientific background upon which to build his business, the pharmacist must then look toward the creation of a demand for his scientific services. But so much for the pharmacist.

Pharmaceutical educators throughout the United States have during the past four years met with thousands of dentists before whom they have discussed U. S. P. and N. F. preparations and at the same time urged them to use the scientific services of the pharmacist. The eagerness to write prescriptions, employing official drugs and preparations, as evidenced by members of the dental profession is almost astounding. They have a most healthy desire to take guesswork out of the prescribing of dental medicaments.

Here is the pharmacist's opportunity to enlarge the scope of his professional activity.

Physician-Pharmacist meetings voice a similar interest in prescribing official drugs and preparations. Physicians are frank in their criticisms of their own groups who depend too much upon pharmaceutical manufacturers for information regarding medicaments. Here, too, is a definite trend toward the prescribing of official drugs and preparations—and here, too, is the pharmacist's opportunity to enlarge the scope of his professional activity.

Creating a demand for his scientific services requires that the pharmacist plan a definite, appealing and continuous campaign to urge the prescribing of U. S. P. and N. F. drugs and preparations. He must be alert to every opportunity so as to make the most of his professional contacts. After planning his own campaign he should acquaint himself with the methods employed by other successful pharmacists—should become active in county, state and national meetings held jointly with physicians and dentists.

To the end that helpful information regarding ways and means of encouraging the prescribing of U. S. P. and N. F. drugs and preparations be disseminated and made available to the pharmacists of this country; and to the end that the good work of one community or state be not lost to other communities or states, may I make the following recommendation for your consideration:

That a committee be appointed—to be known as the National Committee on Professional Information. Its specific function shall be:

First.—To study the methods used by the various local, county and state organizations in their efforts to bring before medical men usable information on U. S. P. and N. F. drugs and preparations.

Second.—To present to the pharmacists of the nation at our next annual convention or before, if the committee deems it advisable, a digest of constructive ideas gathered from such a survey.

Third.—The Committee is to act as a center for receiving and disseminating information which will receive the pharmacist's opportunities for professional scientific service.

Fourth.—The chairman of the committee and two other members are to be appointed by the incoming chairman of this section. Others may be added, if the chairman desires, to make the committee workable.

The report was on motion, duly seconded, accepted. The Chairman stated that the Secretary's Address was embodied in his opening remarks. Sympathy was expressed to Secretary Ballard. The Chairman appointed as members of the Committee on Resolutions: *Chairman*, W. L. Sampson; H. S. Johnson and John A. J. Funk. Members of the Committee on Nominations: *Chairman*, H. Evert Kendig; L. W. Rising and Ralph W. Clark.

Chairman Schicks advised that, unfortunately, it was impossible for Dr. E. J. H. Schneider, who was to speak on "Closer Relations between the Pharmacist and the Dentist," to be present. The Chairman stated that Dr. Schneider has many constructive ideas which can be advanced for the enhancement of the pharmaceutical profession.

Dr. Samuel M. Gordon, Secretary, Council on Dental Therapeutics, American Dental Association, found it impossible to be present on account of an earlier meeting, but sent his paper on "Dentistry and Pharmacy" which was read by the Secretary. A. O. Mickelsen referred to this paper as a typical illustration of the coöperation of dentists and pharmacists. Dentists, in the past, had not been trained to write prescriptions. A great deal of good can be done in a professional way by coöperation, not so much in the group, but with the dentists at home. They should be invited to the college, the pharmacy, into the prescription department, using every opportunity to discuss individual problems with them. They are eager to get information. This affords one of the opportunities for pharmacy.

Edward Ireland inquired whether dentists had been invited to talks or courses in pharmacy or prescription writing.

Chairman Schicks replied "that the invitation or, rather, the request came from them to our college, asking if we could be of assistance to them in giving information concerning drugs and their action, and in regard to prescription writing. This last winter the college gave a series of six lectures to the Essex County Dental Society in New Jersey, free of charge to those dentists who would care to be present at those lectures. This Society offers several branches of instruction to the members of their society each year, and of the six or seven courses offered, we had a larger attendance in this particular course than any of the others. The work was extremely successful." He said "the lecture started about eight thirty, and at eleven thirty we were still there answering questions and conversing with the members of the dental profession. We had six of those lectures, and the work was entirely satisfactory to them and more than encouraging to our teaching staff."

A. F. Marquier said he was glad to know that.

Dean Evert Kendig concluded from his observation that the dentists have been brought in contact with the profession rather intimately during the last several years. Although he is not connected with this particular work, he reiterated what had been said, that dentists are anxious for information about drugs, and it is only within the last five years and possibly a decade that they have become therapeutically conscious, due to the changes in the character of the dental profession. "This year they have introduced into the curriculum a year's study in what we would define as the practice of medicine. At our own school in the Department of Dentistry, which is the old Philadelphia Dental College, they have established a chair of oral surgery. At the present time plans are under discussion for the erection of a building to house that particular phase of dental work. This means stepping into the field of general surgery and those dentists will be trained to practice surgery of the mouth. Unfortunately, the schools of dentistry have not been offered a proper course in therapeutics."

He referred to an experience recently in my own family. The dentist supplied a few tablets for which he might have written a prescription. He continued: "Last winter we celebrated the fiftieth anniversary of the Philadelphia Temple University and in this connection the profession offered many lines. The School of Pharmacy offered to dispense remedies suitable for the use of the different professions.—The dental school, the school of chiropody and so on.—We had mimeographed copies of the formulas of U. S. P. and N. F. products. We mimeographed the same number of sheets to pass out, and we thought that the medical school would use a number largely in excess of the other schools. Much to our surprise at the end of the first day the dental school had exhausted their supply of mimeographed sheets, and we had to run off some more. In other

words, they are getting information they didn't know anything about. It is a marvelous opportunity, if the pharmacists will only take advantage of it."

Marvin J. Andrews said there is considerable discussion about pharmacists getting the dentists to prescribe. He thought that it would be found that it is not only the dentists and the physicians who need to be informed in regard to U. S. P. and N. F. products, but the pharmacists should be kept up-to-date, to know what to give the physicians and dentists when they prescribe. He did not think pharmacists should copy proprietary preparations, but inform the physicians how to prescribe and what vehicles are best suited.

A. B. Nichols said: "For several years I have been in close touch with medical association. A man who is supposed to be trained in writing prescriptions still lacks the knowledge of how to write prescriptions. These men come in and look at the exhibits and they become very enthusiastic. Now when you have that situation in the medical profession, what must it be in the dental profession? There is no limit to what might be done. In Philadelphia, we have had one or two small exhibits in a small way. We have the coöperation of the Dental Association—a committee selected by the Association preparing standard preparations, things that they would like to see officially recognized as U. S. P. and N. F. products. The great difficulty is in getting pharmacists started on any one of these preparations. Make them realize their opportunities by their own personal efforts and it will go over in leaps and bounds. Of course it is a question of the individual. You can't train all pharmacists."

A. F. Marquier wondered whether all this enthusiasm comes from the economic situation in which the country finds itself at the present time. The dentists desire to learn something about drugs and medicine, how to write prescriptions, and so on. When it is all boiled down there must be a reason for it. In every state where there is considerable emergency relief work there is a limited amount of funds. These funds must be conserved, and it is the middle man who pays the bill. The rich man and the poor man are well taken care of, but the middle man pays. In a situation like this the medical society is very much interested in having the coöperation of the pharmacists, and he was of the opinion that it was the duty of pharmacists to give it.

He said: "In New Jersey, we have spent all winter going from one meeting to another, invited by the physicians, giving various talks on how to write prescriptions, and what are good things to prescribe." He considered this a wonderful opportunity, in his estimation, the biggest opportunity the pharmacist has had the last thirty or thirty-five years.

R. A. Lyman inquired whether the American Dental Society has a committee similar to the Council on Pharmacy and Chemistry of the A. M. A.

Chairman Schicks replied that the Dental Association has a similar body and they have their own laboratory where they employ their own chemists, and have a council of dental therapeutics. Analyses are made and are available to all pharmacists through the *Journal of the American Dental Association*. They publish those separately and also give information concerning the analyses, and pharmacists can find enough information in any of these monthly publications to talk before any dental association they might have the privilege of addressing. Chairman Schicks had been asked by a dentist where he could have dental prescriptions filled; he had tried unsuccessfully. The dentist had gone 35 miles to have dental work done and he asked him why he did not go to a local dentist. The dentist replied, "No, I don't want to do that. This fellow is a graduate of a very good school. I feel he can do good work and I prefer going to him." Chairman Schicks said: "All right—then, we have poor doctors and we have good doctors, we have good dentists and poor dentists, poor pharmacists and good pharmacists, and if you use discretion in choosing a dentist for yourself why don't you use the same discretion in choosing a pharmacist to fill your prescriptions for your patients?" He could see the logic in that. In other words, there are plenty of good professional pharmacists, omitting those who are now taking care of the medical and dental demands, if they will take the trouble to search them out and use the same discretion as he used in obtaining treatment.

Chairman Schicks welcomed several students of Rutgers University College of Pharmacy and invited them to participate in the sessions.

Dr. C. L. Whitman was introduced. He spoke on "Dentistry and Pharmacy." He did not stick to the text but brought in experiences called to mind by the discussions. He cited examples, among them the development of preparations containing sodium perborate. He referred to the lectures mentioned by Dean Schicks.

In summarizing, Dr. Whitman said, in his opinion there were four ways in which the professions could coöperate. *First*, individual contact between individual members of the profession. *Second*, group contact by dental schools, pharmacy schools, societies of the two professions and student groups of the two professions. *Third*, establishment of laboratories in pharmacies equipped for diagnosis. And *fourth*, constantly striving for the betterment of all the professions.

R. W. Rodman was introduced by Chairman Schicks who referred to the publicity given by him at this convention. Mr. Rodman presented a paper on "The Hospital Pharmacist and His Opportunity for Service to Pharmacy with the Medical and Dental Professions."

L. W. Rising considered this an opportunity for Schools of Pharmacy and Boards of Pharmacy to coöperate.

O. E. Russell stated that in Indiana the hospital experience under a registered pharmacy is credited.

O. P. M. Canis did not think experience gained in drug stores filling only three prescriptions a day should be credited, but the law requires the recognition.

A. F. Marquier referred to a practice of some hospitals to fill prescriptions for the public in their dispensaries, and this practice is carried beyond these limits.

Secretary R. B. J. Stanbury, of the Canadian Pharmaceutical Association, was introduced. (Dr. Stanbury has been a member of the A. PH. A. for a number of years and a frequent attendant at the annual meetings.) He said, in Canada the apprenticeship in hospitals is not of equal value to that in drug stores. He also spoke of the increasing entrance requirements to schools of pharmacy in Canada. He hoped for advancement in professional pharmacy.

H. W. Mantz was of the opinion that good missionary work was possible in hospitals.

A. F. Marquier discussed the difference of experience in hospitals and drug stores; experience is gained in the latter that does not obtain in hospitals.

The discussion continued for some time on the experience question *pro* and *con*.

W. Bruce Philip introduced the subject of his paper on "Legislation in the Public Interest to Control the Sale of Drugs by Qualified Persons," by pointing out the purposes of legislation and the preparing of laws. He discussed constitutionality, need of legislation, restriction by law, the public interest. In closing his remarks the author said: "I welcome constructive criticism. I do not care whether this bill or some other bill helps us to arrive at the desired point. We must have something to shoot at and therefore center your shooting at this bill with the thought as President Roosevelt said—criticize if you will, but offer something to take its place."

Secretary Stanbury spoke of the codeine situation in Canada: "Some years ago we persuaded the department of National Health to remove codeine from the list of narcotics, particularly drugs, however, not from the poison list. When a person buys codeine the druggist must register it as a poison. That has removed a great deal of difficulty. Codeine is used in cough mixtures and various preparations. It removed a great deal of friction and difficulty with the physicians. The physician can call up and order from his druggist a preparation containing codeine; he does not have to keep any record."

Harvey A. K. Whitney presented a paper on "Some Notes on the Relationship of Physician to Pharmacist." A. F. Marquier read a paper on "Timely Formulæ for Chiropodists." Dean Kendig considered this a timely paper, which presented opportunities for the pharmacist.

It was moved that all papers read before the Section be accepted—carried. The First Session of the Section on Education and Legislation was then adjourned.

SECOND SESSION.

The Second Session of the Section on Education and Legislation was convened May 11th, at 2:15 P.M., by Chairman George C. Schicks.

The first paper read was on "Research in Pharmaceutical Education," by Wm. J. Husa. (No discussion.)

The report of the Committee on Resolutions was called for. It was read by Chairman L. W. Rising. The report was accepted.

The resolutions are as follows:

"To the end that helpful information regarding ways and means of encouraging the prescribing of U. S. P. and N. F. drugs and preparations be disseminated and made available to the

pharmacists of the country; and to the end that the good work of one community or state may not be lost to other communities or states, *be it resolved:*

"That a committee be appointed—to be known as the National Committee on Professional Information. Its specific function shall be:

"*First*—To study the methods used by the various local, county and state organizations in their efforts to bring before dental men usable information on U. S. P. and N. F. drugs and preparations.

"*Second*—To present to the pharmacists of the nation at our next annual convention or before, if the committee deems it advisable, a digest of constructive ideas gathered from such a survey.

"*Third*—The committee is to act as a center for receiving and disseminating information which will increase the pharmacist's opportunities for professional scientific service.

"*Fourth*—The chairman of the committee and two other members are to be appointed by the incoming chairman of this Section. Others may be added if the chairman desires, to make the committee workable."

(The resolution did not reach the Committee on Resolutions in time to be acted upon; it will, therefore, have to come before the next annual meeting—see minutes of the meeting of Executive Committee of the Council of July 17, 1934.)

"*Be it resolved* that this Section on Education and Legislation appoint a committee to study the problem of coöperation with hospital pharmacists."

The Committee expressed appreciation of the splendid address of Chairman Schicks; the report was accepted.

The Committee on Nominations presented the names of the following for officers of the ensuing year: *Chairman*, Oscar E. Russell; *Vice-Chairman*, C. W. Ballard; *Secretary*, L. W. Rising; *Delegate to the House of Delegates*, George C. Schicks.

On motion of C. L. O'Connell and a second, the report was received and the Chairman instructed to cast a unanimous ballot for the nominees.

The next paper read was on "Amendments to the Federal Food and Drugs Act Proposed by Drs. H. W. Wiley and L. F. Kebler Nearly a Generation Ago;" it was read by L. F. Kebler and accepted. He stated that if anybody is interested in reading the hearing he may have the paper.

Chairman Schicks thanked the acting secretary for his coöperation.

The officers of the Section were duly installed.

Chairman Russell took the chair and expressed his appreciation for the honor conferred and promised to continue the work along the standards set by his predecessor.

Chairman Russell referred to the recommendations or resolutions wherein it was stated that the incoming chairman should name the two Committees, the one on the National Dental Committee and the Committee on Coöperation with Hospital Pharmacists. He named the chairmen of these committees and said he would appoint the members later. On the Committee on Coöperation with Hospital Pharmacists he named as Chairman, R. W. Rodman; and on the National Dental Committee he named as Chairman, George W. Schicks.

The Second Session of the Section on Education and Legislation was then adjourned.

SECTION ON COMMERCIAL INTERESTS.

The First Session of the Section on Commercial Interests was convened by Chairman John A. J. Funk on May 9th, at 2:15 P.M. The Chairman welcomed those in attendance and stated that an interesting program would be presented.

The first paper of the session was entitled, "Profit the Way Out," by W. Bruce Philip. This was discussed at length by Henry F. Hein, Edwin E. Taiber, Leo G. Penn, A. V. Burdine, C. Leonard O'Connell and the author. Discussion will accompany the paper in a later issue.

The second paper was entitled, "Furthering Pharmaceutical Publicity through the Open, or Partially Open, Prescription Department," by W. Bruce Philip.

Lawrence Williams was pleased with the presentation; he stated that he had in mind the installation of an open prescription department, but he could also see that it might not always work out very well. He said the public is somewhat skeptical about the filling of prescriptions. If the prescriptionist hesitates, they begin to wonder whether there is anything wrong. Also

there is sometimes the necessity of sending out for an item that is not in stock and required for the prescription; this is not easily done without observation in an open prescription department.

Leo G. Penn stated that he had found the open prescription department predominating in European pharmacies. He was well pleased with his results.

John F. McCloskey was of the opinion that an open prescription department presented opportunities for good publicity. He was in favor of a partially open prescription department.

F. P. Kelly, Jr., stated that the open prescription department was working out very satisfactorily in his pharmacy. It is necessary to maintain a well-equipped clean department and do the work in a way that will impress the customers favorably.

R. R. Gaw believed in an open prescription department. He prefers a pharmacy wherein the public has full view of what is being done and the one who is doing the work.

The next paper "Detailing for Prescriptions" was presented by F. B. Kirby. (No discussion.)

The following papers were read:

"Personnel Policies and Problems," by Dean Edward H. Niles.

"Determining Cost," by Dean C. L. O'Connell.

Secretary R. W. Rodman made a report. (To be published.)

Chairman Funk appointed the following as members of Committee on Nominations: *Chairman*, C. L. O'Connell, Francis A. Britt and Fred Vilas.

The Chairman stated that this concluded the program of the First Session and the Section was then adjourned.

SECOND SESSION.

The Second Session of the Section on Commercial Interests was convened by Chairman J. A. J. Funk, May 10, at 9:10 A.M.

The following papers were read:

"Price Stabilization and Selective Distribution," by Paul C. Olsen.

"What Is an Adequate Order for the Prescription Department?" by Frank A. Delgado.

"Drug Store Location," by Inez K. Rolph.

Vice-Chairman Henry Brown stated that he had been informed by the Department of Commerce that there would be three papers: The first paper "Effect of NRA on Price Conditions," by Wroe Alderson and the next, "Discussion of Phases of the Drug Code." The discussion was in charge of R. W. Rodman.

F. A. Delgado lead the discussion. (To be published.)

The Committee on Nominations reported the following list of officers: *Chairman*, Henry Brown, Pennsylvania; *Vice-Chairman*, R. W. Rodman, New York; *Secretary*, R. T. Lakey, Michigan; *Delegate to the House of Delegates*, John A. J. Funk, Indiana. On motion by John F. McCloskey, duly seconded, the report of the Committee on Nominations was accepted and the officers elected. Chairman John A. J. Funk expressed his appreciation and thanked the members for the support given him. The chairman-elect expressed his appreciation and hoped for cooperation in making the program for next year an interesting and profitable one. R. W. Rodman, the vice-chairman, expressed regrets because of his absence during the sessions on account of publicity work. He thanked Mr. Brown for acting in his place, which made it possible for him to look after publicity work for the ASSOCIATION.

The Final Session of the Section on Commercial Interests was then adjourned. (Parts of the minutes of the Section on Commercial Interests will be supplemented in connection with the publication of the papers and discussions of the Section, after submission to the authors and participants in the discussions.)

The report of the Conference of Pharmaceutical Association Secretaries will be published in a succeeding issue of the JOURNAL; also that of the Conference on Law Enforcement Officials. —*Editor*.

SECTION ON HISTORICAL PHARMACY.

The First Session of the Section on Historical Pharmacy was convened by Acting Chairman J. T. Lloyd at 9:40 A.M., May 11th. The first paper presented was that by Charles H. and Millicent R. LaWall on "A Pre-Revolutionary Account Book of the Marshall Store in Philadelphia."

Mrs. LaWall explained that the paper relates to a pre-revolutionary account book of the Marshall Pharmacy in Philadelphia. The book was exhibited, showing the handwriting which is legible. There was no discussion, but the book was passed around among the members.

The next paper on the program was by Dr. Edward Kremers. He stated that he was prepared in a way to give an illustrated talk but he regretted that he did not have the lantern slides with him. The purpose of the slides was to show how these are used in teaching pharmacy, but not having these slides the lecture will have to be deferred to another meeting.

Dr. Kremers said that this month there will be a meeting in Basel, Switzerland, the first International Congress for the History of Pharmacy. He had programs with him and in his opinion the Section on Historical Pharmacy, A. PH. A., should send a communication to the meeting in Basel and extend greetings by letter or cablegram in time so that these greetings may be received before the close of their sessions. The suggestion was adopted.

Chairman Louis Gershenfeld had arrived at this time and inquired how much work had been done.

Edward Kremers explained the suggestion made by him and the adoption by the Section. He also referred to the American History of Science Society which was now ten years old and stated that a local section had been formed in Washington. He referred to the *International Journal* published by the Society and also to the eight-volume work on the History of Science in preparation by Dr. George Sarton.

Chairman Gershenfeld thanked Dr. Kremers for his remarks. He was of the opinion that something should be said regarding this Society in the JOURNAL OF THE A. PH. A., and it was so ordered.

Chairman Gershenfeld asked that the first order of business be taken up, namely, the reading of the Chairman's Address. It follows:

A PLEA FOR MORE OF THE HISTORY OF PHARMACY.

LOUIS GERSHENFELD, CHAIRMAN.

This week marks the formal opening of the American Institute of Pharmacy. The importance of this structure to pharmacy has been emphasized by many speakers during the dedicatory exercises. As important as the building is, both the museum and the library to be contained therein, much more important will be the spirit of the librarian and his staff and, especially, the sincere endeavor they will display in giving these places a human aspect, a living thing, yes, in making them an integral part of living pharmacy.

I am well aware of the fact that the Smithsonian Institution has a valuable museum devoted particularly to pharmacy. The Library of the Surgeon General's Office has a valuable section of interest to pharmacy. There are a few of the colleges of pharmacy and medical institutions which have valuable historical material suitable for a pharmaceutical museum or library, but nowhere in this country do we have a distinct pharmaceutical historical institute. We, you and I, this Section must guide the expansion of the historical facilities in the American Institute of Pharmacy so that the historical division will rank with the great historical institutes in other branches of science and, especially, with those interested in the history of medicine. This must be done for the benefit of pharmacy, so as to preserve and interpret the unity of scientific pharmaceutical effort. The museum and library must be so established as to coöperate effectively with all schools of pharmacy and pharmaceutical organizations in furnishing displays and exhibits for informative and teaching purposes. Facilities must be made available to develop more serious researches in historical pharmacy; with such an arrangement, historical and bibliographical pharmaceutical research can be made to mean much for pharmacy. Concerning the library and its place in historical pharmacy, let us always remember Milton's words: "A good book is the precious life blood of a master spirit, embalmed and treasured up on purpose to a life beyond life." Ah yes, it is this life beyond the life of its own day, which must be revived and revitalized here as nowhere else, so that you and I may comprehend and enjoy it.

The time is also now at hand for this Section to take a more active interest in an attempt to have more of the historical element injected into pharmaceutical instruction. The pharmacist is woefully ignorant of his profession. Workers in pharmacy must be imbued with the fact that though they owe something to themselves as human beings, they owe something to the unity and

integrity of pharmaceutical science; yes, something to the traditions and heirlooms of pharmaceutical knowledge. It is only by repeated inoculations that an historic appetite can be created and made permanent as part of the general make-up, of any make-up, of any individual. It is by this means that it will be possible for the pharmacist to cultivate a liking for the history of his profession and to reveal for him the status of his particular branch of science in the circle of all other branches of science and particularly the natural sciences. Historical pharmacy will teach him to look beyond a horizon limited by his own specialty into the great wide world of mental activity around and beyond him. A pharmacist who knows only pharmacy knows but little of pharmacy. The true spirit of pharmacy flourishes only through the fusion of the past and the present upon which it thrives. Without historic perception the scientist lapses into the mechanic. In the modern development of the pharmacist into a professional man or a scientist, let us not lose sight of the fact that we must start with the student in pharmacy and that somewhere in the educational system the former must be imbued with the fact that there is a tie-up with the many branches of science in which instruction was given. He must be made conscious of the noble history of pharmacy and the position that its study can occupy in aiding him through life. The interweaving of the historic in pharmacy with the actual in instruction, by radiating through all departments, can as a central force bring into closer relationship the many apparently separated departments, so that all of them may bring about a more united front in attacking some of the greater problems in pharmacy which equally concern all of them. The study of the history of pharmacy and pharmaceutical doctrines will broaden the viewpoint of workers in pharmacy and will liberalize their conception of their profession.

In concluding these brief but I hope important remarks concerning historical pharmacy, may I voice a plea for a more active unit within our own Section? May I suggest that this Section go on record at this time in recommending to the parent body that those entrusted with the future plans of the Headquarters Building shall make arrangements in the latter for the development of a suitable historical division, which by its gradual development may become a distinct pharmaceutical historical institute? May I also suggest that this Section recommend that the ASSOCIATION shall again voice a plea through its official publication for pharmacists to take a greater interest in historical pharmacy and for schools of pharmacy to have more of the history of pharmacy included in pharmaceutical instruction?

F. H. Freericks moved that the recommendations of Chairman's Address be referred to the House of Delegates. It was so ordered.

Chairman Gershenfeld stated that the interesting program was largely due to the efforts of Secretary C. O. Lee.

The following papers were read by title:

"Medical and Pharmaceutical Contributions to Electrical Science," by Charles Whitebread.

"The History of the McNeil Laboratories," by Robert Lincoln McNeil.

"Historical Sketch of the Abbott Laboratories," by S. DeWitt Clough.

"History of Bauer and Black," by A. E. Tatham.

The next paper read was on "The History of Cactus in Medicine," by J. T. Lloyd. The author stated that he hesitated a long time before he offered the title. He obtained the history of the cactus from his father and made a trip to Mexico where he had obtained scenic views in connection with a study and collection of the cactus. It was necessary for him to ask the Mexican government for permission to return and he was treated with greatest courtesy by the Mexican officials. The author made further introductory remarks so that those present might understand the film.

The cactus grows on the very crest of the steepest mountains, which presents the difficulties in gathering. The native gatherers carry their loads down these steep mountains over precipices, on their backs, to the uppermost point they can be reached by burros. He thought this would make an interesting illustrated story but he was unable to get the desired picture and, instead, he presented moving pictures of his father prompted by the number of requests made by members of the ASSOCIATION.

Heber W. Youngken, Wm. B. Day and W. E. Warren expressed their appreciation of the illustrated talk presented by Dr. Lloyd.

A number of questions were asked relative to cactus and answered by the author.

Edward J. Ireland inquired whether it would be possible to have a record of Prof. J. U.

Lloyd's voice in connection with a short talk when showing this film. He thought that this would be of great interest to the Section on Historical Pharmacy.

After considerable discussion it was requested that arrangements be made for recording the voice of Professor Lloyd. This has been done and the record of the voice of Professor Lloyd, and also of former President James H. Beal, has been placed on file and presented to the AMERICAN PHARMACEUTICAL ASSOCIATION.

Chairman Gershenfeld suggested that it be the purpose of this Section, whenever possible, to obtain records of voices of distinguished members.

The next paper called for was that by John Kramer, presented by Prof. Heber W. Youngken, of Antoine Joseph Balard, pharmacist and chemist. (No discussion.)

The following papers were read, without discussion.

"History of the Calcium Lactophosphate Preparations," by Wm. J. Husa and A. P. McLean.

"Dante and the Florence Guild of Physicians, Apothecaries and Merchants," by Edward Kremers.

"American Pharmaceutical Journalism, Individual Journals," by Edward Kremers and Minnie Meyer.

The First Session of the Section on Historical Pharmacy was adjourned.

SECOND SESSION.

The Second Session of the Section of Historical Pharmacy was convened by Chairman Louis Gershenfeld, May 11th, at 2:30 P.M. The first order of business was the reading of the Historian's report. It follows.

HISTORIAN'S REPORT.

BY E. G. EBERLE.

The outstanding event of American Pharmacy is the completion of the Pharmacy building in Washington—the American Institute of Pharmacy—"dedicated to those who have contributed their knowledge and endeavor to the preservation of public health and to the further advancement of science in pharmacy." The site is beautiful—the building faces the Lincoln Memorial; the historic river and Memorial Bridge may be seen from the building; also, the Washington Monument and part of the dome of the Capitol.

This Section passed the following resolutions:

Resolved, that the Local Branches of the AMERICAN PHARMACEUTICAL ASSOCIATION, State Pharmaceutical Associations, Boards and Colleges of Pharmacy as well as other organizations and individuals interested in the progress and development of pharmacy be urged to supply documents of historical interest, relics and museum material to the museum and library of the Headquarters Building of the AMERICAN PHARMACEUTICAL ASSOCIATION at Washington and be it further

Resolved, that organizations and individuals interested in the progress of pharmacy be urged to prepare papers on matters of historical interest for presentation to the Section of Historical Pharmacy of the AMERICAN PHARMACEUTICAL ASSOCIATION.

The Leadbeater pharmacy, in Alexandria, was bought at public auction for the AMERICAN PHARMACEUTICAL ASSOCIATION; and as stated an association in Alexandria purchased the building and will maintain the historic pharmacy as a museum.

Pharmacy's exhibit at the "Century of Progress" interested the public, and the visitors obtained a better understanding of the service of pharmacy; many pharmacists were registered and quite a number of them were from foreign countries. The "Century of Progress" will be opened this month and the Pharmacy Exhibit will be continued as an interesting part of it.

The dedication of the Headquarters will bring ideas forward for sharing in the great work for American pharmacy. It is hoped also to have complete sets of state and national proceedings, laws applying to pharmacy, histories of early pharmacy, photographs of pharmacists who had a part in the development of pharmacy. Individuals have copies of rare and old books which may serve a larger purpose if made part of the library or museum.

At the Madison meeting Dr. Edward Kremers delivered an "Introductory Lecture to a Course in History of Pharmacy." He also presented an historical paper on "The First Modern

Pharmacopœia." Dr. H. H. Rusby has published "Jungle Memories" in which he brings to light his experiences encountered in his expedition to Bolivia and Chile from 1885 to 1887.

The Liebig museum at Giesen has a collection of glassware, typical of the Apothecary shop known to Liebig. Arrangements have been made for the reproductions by the Gesellschaft Liebig museum at Giesen. These bottles lend a charming and distinct note to a pharmacy and may be obtained from the society mentioned.

DONATIONS.

Mention has heretofore been made of donations to the AMERICAN PHARMACEUTICAL ASSOCIATION.

Chairman H. A. B. Dunning in his address at the Madison meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION, referring to the progress of the American Institute of Pharmacy, said:

"Three State associations have contributed special funds for designated purposes. The Texas Pharmaceutical Association for furnishing the offices of the Editor, the Maryland Pharmaceutical Association for furnishing the offices of the Secretary, and the Kansas Pharmaceutical Association has not as yet decided for what its fund is to be used. Suitable acknowledgment will be made of these splendid contributions and it is hoped that the other state associations will make contributions for special purposes, thus emphasizing the close relations between them and the AMERICAN PHARMACEUTICAL ASSOCIATION and associating the name of each of them with the project.

Reference was made in the April JOURNAL to donations by Dr. F. B. Tipton and James E. Hancock. Among other acknowledgments during previous years are those by Mrs. H. M. Whelpley of a large number of photographs, lantern slides, a complete set of U. S. Pharmacopœias, a large collection of badges and other historical contributions. Mrs. Albert Schneider donated a complete set of Dr. Schneider's writings on various subjects. Dr. James H. Beal has stated that additions would be made to the comprehensive library heretofore donated by him. Lawrence Williams, of Baltimore, has contributed a collection of beautiful show globes, bottles and other apparatus and containers; Dr. James A. Spalding, grandson of Dr. Lyman Spalding, the father of the U. S. Pharmacopœia, the proof sheets of Dr. DeButts, of the first U. S. Pharmacopœia and letters dealing with the founding of this standard through E. G. Eberle and these are now part of the historical collection of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Moses Lichtenstein, of Cumberland, Md., has given the ASSOCIATION an Indian mortar and another large stone mortar; D. F. Jones, a cod liver oil syphon. For the class of 1887 of the Eclectic Medical Institute, Prof. J. U. Lloyd has presented a Wedgwood mortar together with its history. The family of Frank H. Carter has given a bell metal mortar from the pharmacy of George W. Sloan and a Loving Cup presented by the ladies of the AMERICAN PHARMACEUTICAL ASSOCIATION to Frank H. Carter, who was Local Secretary of the 1906 meeting, held in Indianapolis.

The School of Pharmacy of the University of Minnesota, through Dean Frederick J. Wulling, will present a display case of illustrations of medicinal plants.

There are many other contributions, all of which will be cataloged so that the donors may be properly and gratefully credited. A number have promised contributions which are holding until they can be properly taken care of. Coöperation has been promised by Dr. Charles Whitebread of the Smithsonian Institution.

A charter for a non-stock corporation has been granted under the name of Landmarks Society of Alexandria. It was also voted unanimously to restore the Leadbeater Pharmacy and building, as far as possible, to the condition of 1792, using the material recently discovered in the attic of the old Stabler store for this purpose. From the opinions of the architects who have been consulted this restoration of the 1792 conditions appears to be possible. This work could not be completed in time for exhibition in May. The Leadbeater (Stabler) Apothecary was recently acquired for the AMERICAN PHARMACEUTICAL ASSOCIATION by the generous gifts of Manuel Hendler, of Baltimore, G. A. Pfeiffer, of New York, and H. A. B. Dunning, of Baltimore.

The fact that Mr. George A. Ball, of Muncie, Indiana, has donated $1000 to the Alexandria Association shows a more than local interest. A brief history of the pharmacy is in preparation and will appear in the JOURNAL prior to the next annual meeting of the ASSOCIATION.

Both the Library and the Museum will serve an interesting and useful purpose; the former to serve pharmacists in research work and in a like way the Museum will have value in depicting the history and development of pharmacy and supplement other libraries and museums of Washington. No specific plans are laid down but will be developed according to the contributions made and opportunities afforded.

IN MEMORIAM.

The following have served pharmacy and record is here made of work well done; in the memory of the deceased we pause for a moment; among them are: Joseph M. Armitage, Princeton, Miss.; Florin J. Amrhein, Boston, Mass.; H. E. Benfield, Cleveland, Ohio; L. C. Brenner, Gonzales, Texas; Joseph W. England, Philadelphia, Pa.; E. H. Gane, Montclair, N. J.; H. G. Greenish, London, England; Joseph L. Mayer, Brooklyn, N. Y.; Barnett Miller, New York, N. Y.; L. Mayer, Brooklyn, N. Y.; C. C. Plitt, Baltimore, Md.; Robert Simpson, Philadelphia, Pa.; Walter V. Smith, Philadelphia, Pa.; Frank B. Stephens, St. Augustine, Fla.; Leo Suppan, St. Louis, Mo.; Walter B. Swindell, Baltimore, Md.; James A. Yates, Pittsburg, Kansas; Harvey B. Robinson, Baltimore, Md. Brief sketches of the deceased may be found in the JOURNAL.

The Historian expects to make further reports on the development of the library and museum as far as historical material is concerned. The removal from Baltimore and the work in connection therewith has interfered with making a more complete and detailed report at this time. It is a pleasure to note the instructive program prepared for this meeting.

The report was accepted.

Heber W. Youngken inquired whether the Whelpley collection of slides were in such shape as to be used from time to time. The Historian stated that these slides were on hand but had not been arranged for lecture purposes at this time, but he agreed with Dr. Youngken that this should be done.

An illustrated lecture was given by Charles H. and Mrs. M. R. LaWall on the "Squibb Collection of Pharmaceutical Antiquities Being the Joe Mayer Collection of Wiesbaden."

The following papers were read by title:

"A Brief History of Apothecaries Hall," by S. G. Gessner.

"History of the First Twenty-Five Years of the Oregon State Pharmaceutical Association," by Dean Adolph Ziefle.

"William Longshaw, Jr.—Naval Surgeon and Pharmacist, a Hero of the Civil War," by Louis H. Roddis, Lt. Comdr. (M.C.) U. S. Navy, Editor, Naval Medical Bulletin.

The next paper presented was on "Patent Medicines," by J. Hampton Hoch.

After conclusion of the paper, Edward J. Ireland stated that very frequently historical papers do not have references, which detracts from the value of the paper. He suggested and made a motion that whenever it is possible references should accompany papers. This was carried.

The next paper presented was on "Notes on Early Drug Legislation," by F. W. Nitardy.

The following papers were read by title.

"History in the Drug Store," by F. B. Kilmer.

"Alchemy," by W. H. Blome.

"A Brief Account of the First Fifty Years of Pharmacy Education at Purdue," by C. O. Lee.

The following paper was presented:

"United States Patents Granted for Medicines during the Pioneer Years of the Patent Office," by Lyman F. Kebler, former Chief, Drug Division, Bureau of Chemistry, U. S. Department of Agriculture.

The author stated that the paper was prompted as the result of some investigation which he was engaged in in connection with patent medicines.

Hugo Kantrowitz, as Chairman of the Committee on Nominations, reported the following nominees for the ensuing year: *Chairman*, C. O. Lee, Indiana; *Secretary*, H. W. Youngken, Massachusetts; *Delegate to the House of Delegates*, Louis Gershenfeld, Pennsylvania; *Historian*, E. G. Eberle, Washington, D. C.

The report of the Committee on Nominations was accepted and the Chairman of the Committee on Nominations was requested to cast a unanimous ballot of the Section for the officers named. The officers of the Section were duly installed.

Chairman Gershenfeld called on Heber W. Youngken, secretary-elect, for a few words. He expressed his appreciation for the honor conferred and stated that he was very much interested in historical matters.

A vote of thanks was extended to Chairman Gershenfeld.—Carried.

The Second Session of the Section on Historical Pharmacy was then adjourned.

AMERICAN MEDICAL ASSOCIATION.

The American Medical Association adopted the following resolution:

Resolved, That the House of Delegates of the American Medical Association endorses in principle the report of the Medical Society of the District of Columbia on the subject of hospitals and dispensaries maintained by the United States Government in the District of Columbia, and the protest of the said society against the extension of the activities of these agencies beyond the legitimate purposes for which they were created; and be it

Resolved, That the House of Delegates recommend that the constituent state associations take such action as may so influence their representatives in Congress that the taxpayers of the country may be relieved of the unjustified expenditure of public funds herein set forth, and that the protest of the medical profession of the District of Columbia may be supported by the voting strength of the national profession.

U. S. P. AND N. F. EXHIBIT AT A. M. A. CONVENTION.

Western Reserve University's School of Pharmacy and the Academy of Pharmacy had three exhibits among the scientific displays of the American Medical Association's convention. Two of these, the U. S. P. and N. F. displays were particularly effective. Each display was housed in its own booth and was in personal charge of the faculty of the School of Pharmacy.

By means of show-cards and samples mounted on the three walls of each booth the visiting physicians were told the why and wherefore of specifying U. S. P. and N. F. preparations; among them: "The professional pharmacist is your source of information concerning the art of compounding. Use him;" "Your prescription is the final expression of your effort in the treatment of disease. Without intelligent prescribing all else is almost useless;" "These N. F. preparations are used in the hospitals of Cleveland;" "These official products may be obtained in any prescription pharmacy." The displays were supplemented by three neatly printed and bound brochures prepared especially for the occasion, which were handed out freely to all interested physicians. The titles of these were: "A Message from the United States Pharmacopœia to Practicing Physicians;" "The United States Pharmacopœia and Your Prescription;" "The National Formulary Can Help the Physician."

Dean Edward Spease had charge of the arrangement and direction of the display.

AMERICAN PHARMACEUTICAL MANUFACTURERS' ASSOCIATION.

Reaffirmation of its position in favor of sound and constructive revision of the Federal Food and Drugs Act was voted by the American Pharmaceutical Manufacturers' Association in annual meeting, June 25th–29th. The revision that the association favors and desires would outlaw false advertising of drugs and prohibit the sale of articles and devices which are dangerous to health when used as directed on their labels, but it must preserve the principle of constructive variation privilege with respect to official drugs subject to label notice of such variation. The association also insisted that such revision provide for an administrative board to review. Resolutions were adopted relating to revision of the law.

The election for officers resulted as follows: *President*, Carl N. Angst, Indianapolis; *Vice-Presidents*, Jesse L. Hopkins, New York, and R. H. Thompson, Toronto; *Secretary*, C. W. Warner, Newark; *Treasurer*, Frank A. Mallett, Des Moines; *Members of the Board of Directors*, George R. Flint, Decatur, Ill.; H. B. Johnson, Pittsburgh, and Frank Schopflin, Kansas City.

COMMITTEE REPORTS

REPORT OF THE COMMITTEE ON INTERNATIONAL PHARMACEUTICAL NOMENCLATURE.

BY A. G. DUMEZ, CHAIRMAN.

To the Members of the House of Delegates:

Your Committee on International Pharmaceutical Nomenclature has been inactive for the past year. This does not mean that the members have not been alert and willing to serve, but that the opportunity to participate in the development of a project in pharmaceutical nomenclature, international in scope, did not present itself. Such work as is being done along these lines at present is apparently being confined to the countries in which it is inaugurated and no attempt is being made to develop it in an international way.

Every now and then an international movement is begun to unify and improve the nomenclature in some fundamental branch of the sciences upon which the foundations of pharmacy rest, but toward which we have little or nothing to contribute, except our moral support. Such a movement was begun in the field of organic chemistry several years ago. The objective of the movement was to formulate a set of definitions and rules to govern the nomenclature of organic chemistry so that greater uniformity would prevail. A commission was appointed by the Council of the International Union of Chemistry to carry on this work. This commission rendered its first report in September 1930, and a second report in 1932. A translation of these reports from the French was made by Austin M. Patterson, and published in the *Journal of the American Chemical Society* last year.

The rules for nomenclature laid down in the above report will be followed by the Committee on Nomenclature of the United States Pharmacopœia, and no doubt also by the committees of revision of other national pharmacopœias, so that indirectly the work of the commission on Revision of the Nomenclature of Organic Chemistry will play a part in the unification of pharmaceutical nomenclature.

It would seem that, if this Association is sincerely interested in promoting greater uniformity in pharmaceutical nomenclature among the nations of the world, it will have to take the initiative in inaugurating the movement designed to accomplish this purpose. To be effective, however, any movement of this character will have to be financed and this is not a propitious time for financing new projects.

REPORT OF COMMITTEE ON PHYSIOLOGICAL TESTING.*

Your Committee has continued the bioassay of Tincture of Digitalis, made for this purpose in 1928, by the U. S. P. X one-hour frog method, as well as by other recognized methods. The assay results indicate somewhat higher values this year than during the preceding year, and further studies are contemplated to determine whether these variations fall within the limits of experimental accuracy of the method. Detailed results are given in the accompanying tables.

During the coming year it is planned to continue these studies on the 1928 Tr. Digitalis stored in 5-gallon unopened containers, assaying it by several methods against: (1) ouabain; (2) a standard digitalis leaf; (3) a tincture prepared from (2) by the Chairman. Close coöperation is being maintained with other organizations engaged in digitalis bioassays from other viewpoints.

Some progress has been made during the year in compilation of a "Who's Who in Bioassays."

Clinical coöperation has been obtained and much time spent in completion of the AMERICAN PHARMACEUTICAL ASSOCIATION monograph upon "Aconitum." Clinical coöperation is now being sought for similar studies upon digitalis and its preparations.

The Committee has been requested to consider the suitability of various standards of reference in routine bioassays, and an attempt is to be made to collect information to serve as the basis of recommendations to the U. S. P. XI Revision Committee.

* Washington meeting, May 11, 1934.

TABLE I.—COÖPERATIVE ASSAYS OF A. PH. A. TR. DIGITALIS BY U. S. P. ONE-HOUR FROG METHOD: CORRECTED FOR STANDARD OUABAIN VALUES.

Lab. No.	Date Assay.	Age Tr. Mos.	1-Ounce Tincture "A." Aa (Amber).	Ab (Blue).	Ac (Flint).	1-Ounce Tincture "B." Ba.	Bb.	Bc.
1	July '29	5	6.5	..	..	8.0	8.2	..
	June '31	28	6.5	8.0	7.0	6.5	9.0	7.0
	Mar. '33	49	4.5	6.5	5.0	7.0	7.0	7.0
	Apr. '34	62	4.5	6.5	5.0	7.0	7.0	7.0
2	July '29	5	7.9	7.9	7.2	7.2	6.4	6.4– 7.2
	Feb. '31	24	10.7–12.3	12.3	12.3–13.8	12.3	13.8	13.8–15.3
	Oct. '31	32	13.3	11.7	15.0	16.7	13.3	20.0
	May '32	39	8.6	9.3	6.0	10.0	8.0	7.5
	Mar. '33	49	7.5	8.3	8.3	8.3	7.5	8.3
	Feb. '34	60	10.0	7.2	10.0	10.0	5.7	5.0
3	May '29	3	4.2	4.2	4.2	6.2	6.2	6.2
	Aug. '29	6	4.0	4.0	4.0	4.8	4.8	4.8
	Nov. '29	9	7.1	5.7	6.4	6.4	8.6	7.1
	Feb. '30	12	6.0	5.0	6.7	7.0	8.6	8.3
	Jan. '31	23	5.6	5.6	6.2	8.3	8.8	6.7
	Feb. '31	24	6.2	5.9	6.2	7.3	7.7	7.9
	Apr. '31	26	8.9	7.8	8.0	..	8.0	10.0
	Mar. '32	37	6.0	6.5	..	4.5	6.5	..
	June '32	40	11.0	11.0	10.0	11.0	15.0	15.0
	Mar. '33	49	11.2	11.9	11.9	12.5	15.0	13.7
	Oct. '33	56	11.1	10.0	11.1	12.0	12.0	12.0
	Jan. '34	59	11.8	13.1	12.0	..	..	..
	Feb. '34	60	7.5	8.7	8.4	9.4	9.4	9.4
4	Feb. '31	24	6.0– 7.5	6.0– 7.5	6.0– 7.5	9.2–10.9	9.2–10.9	9.2–10.9
	Aug. '31	30	8.6–10.0	8.6–10.0	8.6–10.0	12.0–15.0	12.0–15.0	12.0–15.0
	Mar. '32	37	10.0–12.0	10.0–12.0	10.0–12.0	20.0–30.0	20.0–30.0	20.0–30.0
	July '32	41	6.7– 8.6	6.7– 8.6	6.7– 8.6	10.0–12.0	10.0–12.0	10.0–12.0
5	Jan. '31	23	4.7	4.7	4.7	5.6	4.4	5.6
	Apr. '31	26	4.7	4.7	4.7	..	..	..
	June '32	40	9.4	9.4	10.6	10.6	10.6	11.9
	Mar. '33	49	8.2	7.7	7.7	10.9	8.6	11.4
	Mar. '34	61	9.0	7.6	7.6	11.0	9.0	11.0

TABLE II.—COÖPERATIVE ASSAYS OF A. PH. A. TR. DIGITALIS.

Lab. No.	Method Assay.	Date Assay.	Age Tr. Mos.	4-Ounce. Aa Cc./Kg.	Ba Cc./Kg.	5-Gallon. Ac Cc./Kg.
1	1-hr. frog	Apr. '34	62	5.5	6.0	6.0
2	1-hr. frog	Feb. '34	60	6.4	5.7	5.0
3	1-hr. frog	Jan. '34	59	8.9	11.4	..
		Feb. '34	60	7.5	8.1	8.0
	M. L. D. guinea pig	Feb. '34	60	2.5	3.0	3.5
	M. L. D. cat	Feb. '34	60	...	0.5–0.7	..
6	Frog freq. curve	Feb. '34	60	...	..	13.4

TABLE III.—COÖPERATIVE ASSAYS OF A. PH. A. TR. DIGITALIS—1 Ounce.

Lab. No.	Method Assay.	Date Assay.	Age Tr. Mos.	Tincture "A." Aa.	Ab.	Ac.	Tincture "B." Ba.	Bb.	Bc.
1	4-hr. frog	July '29	5	9.0	8.3	...	12.0	11.0	...
		June '31	28	7.5	10.0	9.0	7.5	12.0	9.0
		May '33	51	6.5	8.5	7.0	9.0	9.0	8.5–9.0

2	M. L. D. frog	July '29	5	10.0	11.0	12.0	12.0	10.0	12.0
		July '30	17	15.0	12.0	14.0	18.0	16.0	16.0
		Jan. '31	23	11.0	11.0	12.0	13.0	14.0	14.0
		Oct. '31	32	15.0	18.0	15.0	18.0	18.0	18.0
6	Frog freq. curve	Mar. '32	37	12.2	12.2	11.9	15.4	15.0	15.4
		July '32	41	11.5	12.9	12.4	13.4	14.4	13.3
		Mar. '33	49	12.2	12.0	12.0	15.0	14.4	14.2
		Feb. '34	60	13.2	12.8	11.2	14.5	15.6	12.8
3	M. L. D. guinea pig	May '29	3	5.0	5.0	5.0	9.0	9.0	9.0
		Aug. '29	6	5.0	...	...	6.0	...	...
		Feb. '31	24	5.6	5.6	5.6	6.4	6.4	6.4
		Feb. '34	60	2.3	3.0	2.8	3.5	4.0	3.0
5	M. L. D. cat	Feb. '31	24	0.68	0.87	0.86	1.17	1.18	1.29
7	Chem.*	Feb. '34	60	3.9	5.1	4.6	5.2	5.8	5.5
	p_H	Feb. '34	60	5.88	5.92	5.94	5.85	5.82	5.94

* Chemical assay by modified K-D method.

p_H by Wilson hydrogen electrode method: checked against U. S. P. Standard Tincture and recalculated to standard of 6.0 cc.

TABLE IV.—CHANGE IN A. PH. A. TR. DIGITALIS ON AGING: ONE-HOUR FROG ASSAY. AVERAGE DATA FROM ALL LABORATORIES AS PER CENT U. S. P. STANDARD.

Age Mos.	1-Ounce. A % U. S. P.	1-Ounce. B % U. S. P.	1-Ounce. B as % of A.	4-Ounce. A % U. S. P.	4-Ounce. B % U. S. P.	4-Ounce. B as % of A.	5-Gallon. A % U. S. P.
0	...	..	80	...	..	80	...
3	143	97	68	143	97	68	...
6	98	91	92	...	..	..	143
9	94	85	90	...	..	..	...
12	102	75	74	...	..	..	...
24	87	67	78	...	..	..	...
30	61	48	79	...	..	..	...
36	72	47	66	...	..	..	...
42	65	51	79	...	..	..	..
48	73	61	84	...	..	..	...
60	67	65	98	85	77	91	95

(Signed) L. W. ROWE,
E. E. SWANSON,
JAMES C. MUNCH, *Chairman.*

THRIFTY DRUG STORES (CALIFORNIA) ORDERED TO SURRENDER BLUE EAGLE.

The Thrifty Drug Stores, a California chain with headquarters in Los Angeles, was ordered by NRA to surrender its Blue Eagles, for violation of the trade practice provisions of the retail drug code.

The case has been referred to the Litigation Division, with the request that suit be filed to obtain an injunction restraining further violation.

According to press reports this order was made non-effective by a court action. Compliance with codes depends on confidence in the officials and in assurance that no partiality is shown in enforcing them.

BUSINESS SUBSIDIES UNDER NRA.

It is not right to say that business has received no Government subsidy. Yet relatively a small percentage of those who went under the codes and volunteered to shorten hours and increase pay-rolls were Government beneficiaries. They put up the additional money needed out of their own reserves, and if reserves had already been exhausted they borrowed from private sources.

EDITORIAL NOTES

Because of association matter in this issue a number of items were omitted from this department.

COMPARISON OF CYANIDE ANTIDOTES.

Sodium nitrite combined with sodium thiosulphate, sodium nitrite, methylene blue and sodium thiosulphate, in order of decreasing efficiency, have been found to be clinically useful and experimentally effective in protective and resuscitative treatments of fatal cyanide poisoning, according to a recent paper of P. J. Hanzlik and A. P. Richardson of Stanford University, School of Medicine. They also found glycerinic aldehyde to be experimentally effective but clinically inadvisable.

NATIONAL BOTANIC GARDEN IN WASHINGTON.

The House Library Committee in coöperation with botanists and others has provided for the appointment of sub-committees to carry on the work of establishing a great national botanic garden. Frederic A. Delano, chairman of the National Capital Park Planning Commission, has agreed to act as chairman of the general committee and will appoint the sub-committees. The project is of general interest, including pharmacists. More than 400 questionnaires have been addressed to botanic gardens in all parts of the world, seeking information, and many replies have been received.

NORTHWEST RECTANGLE, WASHINGTON.

"The Northwest Rectangle, under plans announced by the National Capital Park and Planning Commission, promises to become an architectural rival of the downtown triangle, one of the world's most imposing cluster of Government bulidings.

"This site plan, released by the Park and Planning Commission, shows graphically the composition of the proposed Northwest Rectangle. On the extreme left (west) are the Naval Museum and Navy Building of the future. Then come the National Institute of Health and Naval Hospital, now in use. Next are the projected War Department, three undesignated buildings and the Interior Building. A strip along E Street between Eighteenth and Twenty-Third would be transformed into a chain of small parks. To the south, between C Street and Constitution Avenue, are indicated the *American Institute of Pharmacy*, National Academy of Sciences, Public Health Service and proposed administration building of the Pan-American Union. The square bounded by Twentieth and Twenty-First Streets, C Street and Constitution Avenue and now occupied by a temporary building housing the Federal Trade Commission would be the site of some future semipublic building."

PERSONAL AND NEWS ITEMS.

We are advised that the names of Mr. and Mrs. W. Paul Briggs and of Mr. and Mrs. George M. Hocking, of Washington, D. C., were not included in the List of Registrants in May JOURNAL, A. PH. A.

At recent commencement exercises of St. John's University, **Dean John L. Dandreau,** of the College of Pharmacy, was awarded the degree of Doctoris Judicæ Scientiæ (S.J.D.).

Samuel C. Henry, former secretary of the N. A. R. D., has been named associate editor of the *American Druggist*.

Dean J. G. Beard was honored at the commencement exercises by associates at the University of North Carolina, on the completion of his 25th year as teacher in the School of Pharmacy.

Thurston Merrell spoke on "The Personal Factor in Pharmacy," at the recent meeting of West Virginia Pharmaceutical Association.

A. Kiefer Mayer was awarded the degree of bachelor of science in pharmacy at the commencement exercises of Indianapolis College of Pharmacy. The degree was conferred by **F. E. Bibbins,** president of the Board of Trustees.

E. V. Zoeller, of Tarboro, N. C., was, on June 14th, presented with a national certificate of honorary membership in the Rho Chi Society. The presentation was made at a dinner given at the State University by the local chapter after tributes had been paid to his life and career. The other members of the Board of Pharmacy as well as the teaching staff of the School were present as invited guests. Mr. Zoeller became a member of the A. PH. A. in 1878.

John W. Power was appointed to be an Administration member of the Code Authority for the package medicine industry. Mr. Power is now serving on other code authorities of New York.

James M. Penland, president of the Southwestern Drug Corporation, former president of the National Wholesale Druggists' Association and widely known financier and jobber, was married to Miss Ethel McLaughlin Dunn of New York City and Savannah, Georgia, June 13th, at Whitewright, Texas.

Vice-President John Nance Garner, a citizen of Uvalde, Tex., who got his political start from a drug store mishap, has been made a member of the Texas Pharmaceutical Association. A sterling silver membership card was presented to him by representatives of that organization during the recent convention of the AMERICAN PHARMACEUTICAL ASSOCIATION in Washington.

Clyde Eddy, member of the AMERICAN PHARMACEUTICAL ASSOCIATION, well-known pharmacist, writer and explorer whose thrilling 800-mile voyage down Colorado River has been given wide publicity, will again make that trip, associated with Dr. Russel G. Frazier, of Bingham Canyon, Utah. It will be known as the "Eddy-Frazier Colorado Expedition."

The purposes of the expedition are to complete a pictorial record begun by Mr. Eddy in 1927; to compile temperature records through Grand Canyon, and to accumulate geographical data concerning the river and canyons above Boulder Dam. The Expedition will also place a bronze plaque at Separation Rapids where three members of Major Powell's party left his exploring party in 1869 and were killed on the rim of the canyon by Indians.

The story of the first expedition by Mr. Eddy was published in "Down the World's Most Dangerous River;" English edition—"Danger River."

Purdue University has published in booklet form the address delivered by **Edward Kremers** at the Convocation celebrating the 50th anniversary of the Purdue University School of Pharmacy, entitled "The Old Northwest Territory and Pharmaceutical Education."

The Oregon State Monthly has an article by **Dean A. Ziefle** on "Pharmacy as a Vocation." Publicity plans have been started for the 1935 A. PH. A. meeting to be held in Portland, Ore., in 1935.

A study of the efforts of the drug industry to correct uneconomic price practices through carefully controlled distribution by E. Allen Newcomb, son of E. L. Newcomb, secretary of the National Wholesale Druggists' Association, was submitted to the faculty of Harvard University School of Business for his Master's degree.

News-Week, of June 16th, states "Faculty members of the University of Chicago and newspaper men sat popeyed last week in the University's Oriental Institute. Before them a panorama of the human race was unrolled on the screen. It was a private view of 'The Human Adventure,' by Dr. James Henry Breasted,[1] a film showing how the secrets of dead empires are brought to light by archeologists."

A reproduction of the establishment of Eli Lilly, Sr., which stood at Pearl and Meridian Streets, Indianapolis, fifty-eight years ago, is to be erected in a two-story brick building. The structure will contain as near as possible the same equipment that Eli Lilly, Sr., had in the original laboratory in 1876. Some of this equipment has been preserved, and the instruments that have been lost or destroyed will be rebuilt. The replica will be opened for the first time at the dedication of the research building in October.

The Pharmaceutical Echo is published by the Student Branch, A. PH. A., State College of Washington. The editor is Marlowe Dittebrandt; assistant editor, Alice Swanson. The April number is dedicated to Miss Belle Wenz, member of the Faculty Board of Control. Articles of that issue are of interest and well selected.

OFFICERS OF STATE PHARMACEUTICAL ASSOCIATIONS.

Reports on some of the State Associations were made in previous issues of the JOURNAL and additional items are added in this number.

The JOURNAL will thank association officers for corrections of the list printed in each issue of the roster, in the advertising section. The JOURNAL will also welcome reports and photographs of officers and donations of historical material for the museum of the American Institute of Pharmacy.

A number of reports had to be omitted, and will follow in the next issue of the JOURNAL.

[1] A pharmacist in earlier years.

Idaho Pharmaceutical Association will sponsor a caravan of Idaho pharmacists to attend the meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION in Portland, Ore.

ALABAMA.

General Hugh S. Johnson was called upon by the Alabama Pharmaceutical Association to include a markup covering labor cost as a part of the cost definition of the Retail Drug Code. Another resolution called upon the United States military and naval commands to recognize the profession of pharmacy.

Officers for the ensuing year are: *President*, C. C. Thomas, Selma; *First Vice-President*, N. G. Hubbard, Birmingham; *Second Vice-President*, Sam Watkins, Dora; *Treasurer*, Wilbur Ward, Tuscaloosa; *Secretary*, W. E. Bingham, Tuscaloosa. W. E. Bingham[1] was presented with a loving cup as the oldest living member of the organization.

ARKANSAS.

The Arkansas Pharmaceutical Association met in Texarkana, June 12th–14th. The members decided to make a special study of the model narcotic law and encourage policies in keeping with the ideas of the drug industry.

The following officers were elected: *President*, John P. Cox, Hope; *First Vice-President*, Purcell Smith, Little Rock; *Second Vice-President*, J. Howard Warfield, Stuttgart; *Treasurer*, Joseph Poch, Jr., Little Rock; *Secretary-Manager*, Ira Brite, Fort Smith. Offices of the Association will be established in Little Rock.

CALIFORNIA.

The twenty-eighth annual convention of the California Pharmaceutical Association held at Sacramento, June 3rd–6th, registered an attendance of about 400. It was one of the most definitely fruitful meetings ever held. Discussions centered on codes and fair prices. Mrs. Edna Gleason gave fully of her time and energy in the past year and presided over the sessions with vigor and dispatch.

The following officers were elected for the ensuing year: *President*, C. R. Brogan, Los Angeles; *First Vice-President*, W. E. Rutherford, Santa Rosa; *Second Vice-President*, Charles R. Seward, Pasadena; *Third Vice-President*, L. J. Fischl, Berkeley; *Treasurer*, John Wagner, Long Beach; *Secretary*, Roy S. Warnack, Los Angeles. *Executive Committee: Chairman*, Edna Gleason, Stockton; George H. Frates, San Francisco; R. M. Leise, Los Angeles.

COLORADO.

Colorado Pharmaceutical Association had the largest meeting in its history. Alfred W. Pauley, of St. Louis, was one of the speakers. Among the resolutions was one urging the education of the public to the menace of price-cutting and misuse of the word "drug."

The following officers were elected: *President*, William C. Alexander, Salida; *First Vice-President*, Paul G. Stodghill, Denver; *Second Vice-President*, Clyde C. Phillips, Colorado Springs; *Treasurer*, V. N. Lagerquist, La Junta; *Secretary*, C. J. Clayton, Denver.

FLORIDA.

The following officers were elected by Florida Pharmaceutical Association: *President*, Don Evans, Orlando; *First Vice-President*, Victor Wray, Haines City; *Second Vice-President*, George Taylor, Miami Beach; *Third Vice-President*, J. A. Jones, Daytona Beach; *Secretary-Manager*, M. S. Adler, Tampa; *Members of the Executive Committee, Chairman*, J. K. Clemmer, Miami; E. P. Purcell, Tampa; L. H. Penberthy, Tampa; F. Lindeman, Leesburg; and D. G. Perry, Avon Park.

GEORGIA.

Georgia Pharmaceutical Association elected the following officers: *President*, W. T. Knight, Jr., Savannah; *First Vice-President*, R. Lee Olive, Augusta; *Second Vice-President*, Walter West, Sandersville; *Third Vice-President*, H. Peters, Manchester. Robert C. Wilson, of Athens, was named *Secretary-Treasurer* by the board of directors, in the post-convention session of the group.

Discussion of "price stabilization," the adoption of the mail ballot method of voting for elective officers in the future, and the appearance of speakers of national renown attracted the largest assemblage of retail druggists ever recorded at a Georgia convention.

IDAHO.

The 28th annual meeting of Idaho Pharmaceutical Association was held at Lewiston, June 25th–26th. No outside speakers were on the program and President J. B. Ostrander made no address. The secretary's report was distributed in printed form; the net assets of

[1] Deceased July 10, 1934.

the Association were shown to be $1458.52.

The following officers were chosen to serve for the year 1935: *President*, Charles Carter, Moscow; *First Vice-President*, C. R. Isenburg, Rupert; *Second Vice-President*, Earl Evans, Idaho Falls; *Secretary-Treasurer*, Elmer B. Williams, Boise.

ILLINOIS.

Illinois Pharmaceutical Association elected the following officers: *President*, George V. Haering, Chicago; *First Vice-President*, H. M. Anderson, Monmouth; *Second Vice-President*, L. Brown Hamilton, Galesburg; *Third Vice-President*, E. J. Merriman, Joliet; *Secretary*, W. B. Day, 715 S. Wood St., Chicago; *Treasurer*, George Bennett, Urbana. La Salle was chosen as the 1935 convention city.

IOWA GROUP ASSOCIATION MEETING.

An important meeting was recently held of Association officials including presidents and secretaries of various group organizations in Iowa. Seventeen of the twenty-one group presidents were present and fifteen secretaries. All officers of the State association were present. The purpose of the meeting was to coordinate the work of the various groups and come to a more definite understanding as to what may be accomplished.

INDIANA.

The following officers were elected by Indiana Pharmaceutical Association at its annual convention held at Lake Wawasee: *President*, E. A. Ridgely, Gary; *First Vice-President*, Ed. Harper, Muncie; *Second Vice-President*, G. D. Revington, Monticello; *Third Vice-President*, Ralph E. Thornburg, Syracuse, and *Secretary*, F. V. McCullough, New Albany.

KENTUCKY.

Kentucky Pharmaceutical Association elected the following officers: *President*, Henry Frankel, Louisville; *First Vice-President*, W. E. Albritton, Paducah; *Second Vice-President*, E. C. Williams, Adairville; *Third Vice-President*, Herman Schuler, Covington; *Recording Secretary*, J. W. Gale, Frankfort; *Corresponding Secretary*, R. A. Gale, Frankfort; *Treasurer*, William J. Johnson, Mayfield.

LOUISIANA.

Louisiana Pharmaceutical Association elected the following officers for the ensuing year: *President*, William A. Worner; *Vice-Presidents*, Joseph Clesi, New Orleans; A. J. Boudreaux, Opelousas; Henry Richardson, New Orleans; Raymond Ware, Monroe, and John P. Campbell, Alexandria; *Treasurer*, Elmo Cire, New Orleans; *Secretary*, Paul Wellbacher, New Orleans; *Members of Executive Committee*, Roy A. Dean, Monroe, and Eugene Vogt, Ferriday.

MARYLAND.

See June JOURNAL for officers of the Association.

Among the speakers at the meeting were President Robert P. Fischelis of the A. PH. A.; A. E. Hungerford, Maryland Director of International Emergency Relief; President Ernest Little of the A. A. C. P.; Dr. Robert H. Riley, Maryland Director of Health, and Dr. Huntington Williams, Commissioner of Health of Baltimore. President L. V. Johnson's address was forceful in many respects. Evidently, he is not in full accord with all provisions of the New Deal.

MASSACHUSETTS.

Recommendations by Mr. Adamo which were adopted by the convention include: Reorganization of Massachusetts druggists by enrolling every registered pharmacist of desirable character; a paid executive for continuous administrative responsibility; revision of by-laws; endorsement of the New England Drug Show, after a study by the executive committee when the time arrives; continuation of the usual scholarship in the Massachusetts College of Pharmacy.

Officers for the ensuing year are: *President*, Joseph A. Martin, Malden; *Vice-Presidents*, T. Joseph McAuliffe, Lynn, and John E. F. Cusick, Fall River; *Secretary*, Carl G. A. Harring, Newton Center; *Treasurer*, Lyman W. Griffin, Allston; *Trustees of Permanent Funds*, John R. Sawyer, Herbert Packard and P. J. Cuddyer.

MISSISSIPPI.

The Mississippi Pharmaceutical Association met in Jackson, June 18–20, 1934. An effort is being made in Mississippi to return the drug business to pharmacists.

The following officers were elected: *President*, Lew Wallace, Laurel; *First Vice-President*, J. S. Puller, Starkville; *Second Vice-President*, John C. Hodge, Natchez; *Secretary-*

Treasurer, S. B. Key, Jackson. Tupelo was chosen as the convention city for 1935.

NEW YORK.

The New York Pharmaceutical Association met in convention at the Sagamore Hotel, Lake George, June 21st–24th. The attendance was unusually large, meetings well attended, and one of the high lights of the occasion was a splendid address by Dr. R. L. Swain. During the convention more than one thousand names were added to the membership.

The following officers were elected: *Honorary Presidents*, John Scavoc, New York City, and Jacob Diner, New York City; *President*, John F. O'Brien, Rochester; *First Vice-President*, Henry Wildhack, Newark, N. J.; *Second Vice-President*, Morris Brodkin, New York City; *Third Vice-President*, Charles Heimersheimer, Brooklyn; *Executive Secretary*, Robert S. Lehman, Brooklyn; *Treasurer*, Richard Austin, Cairo.

It was recommended that the convention in 1935 be held at Hotel Sagamore.

NORTH DAKOTA.

The following officers were elected by North Dakota Pharmaceutical Association: *President*, L. G. Beardsley, New Rockford; *Vice-Presidents*, Cap H. Saunders, of Minot, and A. E. Erickson, of Fargo; *Secretary*, W. H. Sudro, Fargo; *Treasurer*, P. H. Costello, Cooperstown.

The convention asked abolition of the classification of assistant pharmacists now established under state law, and suggested that special privileges to take examinations to become full-fledged pharmacists be accorded to men now holding positions under the assistant classification.

PENNSYLVANIA.

The 57th annual convention of the Pennsylvania Pharmaceutical Association met on June 19th, at South Mountain Manor, Wernersville, the largest number in the history of the Association, nearly six hundred, being present.

The officers for the ensuing year were elected, as follows: *President*, Frank P. Kelly, Carbondale; *First Vice-President*, Harry E. Wertz, Johnstown; *Second Vice-President*, Henry V. DeHaven, West Chester; *Third Vice-President*, J. W. Garlick, Upper Darby; *Secretary-Treasurer*, J. B. Pilchard, Harrisburg; *Executive Committee: Chairman*, Henry Brown, Scranton; John C. Walton, Philadelphia; Robert R. Gaw, Pittsburgh.

The following were elected to honorary membership in the Pennsylvania Association: Dr. W. O. Frailey, Sr., Lancaster; Dr. George A. Gorgas, Harrisburg; Dr. Richard V. Mattison, Ambler; Dr. E. F. Kelly, Washington, D. C.

In 1935 the Association will cruise on Lake Erie, June 17th–21st.

Much constructive work was accomplished and altogether the 1934 convention was conceded quite a success.

(*To be continued.*)

OBITUARY.

OTTO P. MEYER.

Otto Paul Meyer, member of the AMERICAN PHARMACEUTICAL ASSOCIATION, vice-president of the Meyer Brothers' Drug Company, St. Louis, died June 20th, in Port Huron, Mich., aged 64 years. Pneumonia was the direct cause of his death.

Mr. Meyer was born in St. Louis in 1870, son of the late C. F. G. Meyer. He received his education at Smith Academy and at the University of Michigan, graduating in 1892, and became affiliated with the drug company on the completion of his studies. Mrs. Meyer, two daughters, two brothers and one sister survive the deceased.

W. E. BINGHAM.

William Ellison Bingham, one of the veteran pharmacists in the AMERICAN PHARMACEUTICAL ASSOCIATION and an *honorary president* of the National Association Boards of Pharmacy, died July 10th, at his home in Tuscaloosa, following a heart attack, aged eighty years.

Mr. Bingham helped to organize the Alabama Pharmaceutical Association in 1878. He was chairman of the Committee which drafted the first Alabama pharmacy law; a member of the Alabama Board of Pharmacy and its secretary for many years. At the recent meeting of Alabama Pharmaceutical Association he was presented with a loving cup in recogni-

tion of the esteem in which he was held, and as the oldest living member of the organization and its secretary for thirty-four years.

Mr. Bingham is survived by a daughter and a son.

E. B. SHUTTLEWORTH.

Widely known and respected in both the Provincial and Dominion fields of pharmacy, Prof. Edward Buckingham Shuttleworth died in Wellesley Hospital, June 24th, aged 92 years. A veteran of the American Civil War and known as an artist, Professor Shuttleworth made pharmacy his life-work, teaching on the staffs of two colleges and acting for many years as Toronto bacteriologist. His early education was obtained in Ireland, where he studied chemistry under Sir Robert Kane at the Royal College of Science, Dublin. He came to Canada with his parents; he engaged in the drug business in Montreal and, later, conducted a wholesale drug establishment in Toronto.

When the Ontario College of Pharmacy was founded, he was appointed its first dean, and also established the *Canadian Pharmaceutical Journal*, in 1868, and edited the publication for many years. In 1893, Professor Shuttleworth was made a Doctor of Pharmacy by Trinity University, and he was also an honorary member of a number of Canadian and American pharmaceutical organizations.

LEGAL AND LEGISLATIVE.

THE DRUG CODE BEST IN THE FIELD.

The following is quoted from an editorial of the *Kanas Pharmaceutical News:*

"With all its faults and weaknesses, its lack of vital parts which we believe are necessary for the complete success of NRA and the Retail Drug Code, our (The Retail Drug) Code is the best yet of the many retail merchandising codes. No other retail merchandising code has a 'cost provision' in it equal to ours. The 'dozen price list' clause is in no other retail Code as yet. We are far ahead of other retail groups. Of course, it is admitted that the 'cost' provision alone will not cure all of the many ills of price cutting, but it puts a stop to selling below list price, which is an important milestone along the highway to recovery and recovery is what we are striving to attain. The next milestone to try for is an 'overhead' or 'operating cost' to be added to 'price list' cost."

RETAIL DRUG CODE BOARD DISAGREES WITH DARROW FINDINGS.

Small druggists have found in the retail drug code real protection against "the predatory practices of large operators, according to a resolution of the Retail Drug Code Authority." The resolution, forwarded to NRA Administrator, Hugh S. Johnson, "condemns as intemperate, unjust and unfair" the recent report of the "Darrow Board" that the operations of NRA codes oppress the "small man" and the resolution emphasizes that the retail drug code has neither created nor fostered monopoly.

The administration, according to the resolution, has recognized the fundamental fact that the curbs on predatory competitive practices must differ between various fields of business activities, and the code authority expressed its confidence that all codes will be administered fairly by the administration "to the benefit alike of the small man and the consumer."

PROHIBITED ADVERTISING IN THE CANADIAN FOOD AND DRUGS ACT.

1. Subsection one of Section three of the Food and Drugs Act, Chapter seventy-six of the revised Statutes of Canada, 1927, is amended by adding thereto the following paragraph immediately after paragraph (*h*) thereof:

"(*i*) Adding to or removing from the list contained in Schedule A hereto such abnormal physical states, disorders, diseases or symptoms of diseases, and adding to or removing from Schedule B hereto such material, as may be deemed by the Minister to be necessary in the public interest."

2. The said Act is further amended by adding thereto the following section immediately after Section six thereof:

"6*a*. No persons or company shall import, offer for sale or sell any remedy represented by label or by advertisement to the general public as a treatment for any of the diseases, disorders or abnormal physical states named

or included in Schedule A to this Act or in any amendment to such schedule."

SCHEDULE A.

Alcoholism, Appendicitis, Arteriosclerosis, Blood Poisoning, Bright's Disease, Cancer, Diabetes, Diphtheria, Dropsy, Epilepsy, Erysipelas, Gall-stones, Kidney Stones, Bladder Stones, Gangrene, Gastric and Duodenal Ulcers, Goitre, Heart Diseases, High Blood Pressure, Infantile Paralysis, Influenza, Lockjaw, Locomotor Ataxia, Obesity, Pleurisy, Pneumonia, Ruptures, Scarlet Fever, Sexual Impotence, Smallpox, Spinal Meningitis, Trachoma, Tuberculosis, Tumors, Typhoid Fever, Venereal Diseases.

5. This Act shall come into force on the first day of January 1935.—*Canadian Pharmaceutical Journal.*

BOOK NOTICES AND REVIEWS.

Handbuch der Experimentellen Pharmakologie. HERAUSGEGEBEN VON A. HEFFTER UND W. HEUBNER, Dritter Band 2 Teil, with 66 figures, pages 621–1503. Julius Springer, Berlin, 1934.

This volume gives an extensive discussion of the pharmacological properties of iron, manganese, cobalt, nickel and their compounds. The review of iron and its compounds is given by Professor Starkenstein (Prague) and covers more than 600 pages. The book is written in an authoritative way, with a critical discussion of the very extensive literature and should be of great value to any pharmacologist. The following two parts of Volume III, dealing with silver, mercury, copper, zinc, lead, gold, metals of the platinum group, aluminum, rare elements, bismuth, tungsten, molybdenum, uranium, chromium, cadmium, tin, vanadium, will be published in the near future. An excellent general chapter on the pharmacology of metals is contributed by Professor Heubner which should be of interest to any chemist and pharmacist. Inorganic and organic compounds containing metals are discussed, a critical review of oligodynamic action and of the effect of metals on growing organisms are found among other topics in this chapter. Peculiarly enough, the beneficial effect of traces of certain elements upon the growth of plants and other organisms is not mentioned.

The part dealing with the physico-chemical properties of iron and its compounds is not entirely satisfactory. The statement, for example, that a strongly acid solution of ferrous iron is not oxidized by air (page 702) is wrong; actually such solutions are extremely sensitive to air oxidation.

On page 730 it is mentioned that positively charged hydrous ferric oxide sols mainly adsorb negative substances. Primarily, however, we are dealing in these cases with a hydrogen-ion adsorption with a subsequent secondary adsorption of negatively charged ions or complexes. The outstanding rôle of the hydrogen ions should have been pointed out more clearly.

The above-mentioned statements do not detract from the merits of the book. The printing and appearance are excellent. In addition, the publisher deserves praise for his optimism in making available a handbook of this size in these times.—I. M. KOLTHOFF.

International Formulary of Ships' Medicines, 1934, issued by the International Pharmaceutical Federation, 43 Leeuwerikstraat, Leiden, Holland.

In 1929 the Netherland Association for the Promotion of Pharmacy drew attention to the difficulty experienced by pharmacists in seaports in replenishing Ships' Medicine Chests. There is not only a difficulty in ascertaining the formula required, but delay may be occasioned and result in a ship leaving without being able to obtain the necessary medicines. It is to overcome these difficulties that the International Pharmaceutical Federation prepared this volume, issued under the direction of Dr. J. J. Hofman, President, and Dr. T. Potjewijd, General Secretary. The Board of the Federation expresses indebtedness to Secretary H. N. Linstead, of the British Pharmaceutical Society, Dr. Fritz Wartenberg, of Berlin, and Prof. E. Collard, of the Faculty of Pharmacy, Strasbourg. The Board states that it is hoped this book will be used extensively and that it will simplify the work of pharmacists in seaports and those responsible for the care of medicines on board of ships.

The countries represented in this volume are Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden and the United States.

It is not compulsory for American ships to carry any medicine, but a list of preparations has been recommended by the American Marine Standards Committee of the Department of Commerce. These preparations include aromatic spirit of ammonia, aspirin tablets, sodium bicarbonate tablets, bismuth subnitrate tablets, mercuric ointment, sodium bromide tablets, brown mixture tablets, calomel ointment, castor oil, potassium chlorate tablets, compound cathartic pills, Dover's powder, ear drops, eye solution, gargle solution tablets, epsom salt, morphine sulphate tablets, oil of cloves, camphorated tincture of opium, potassium permanganate tablets, rhinitis tablets, soap liniment, strychnine sulphate tablets, sulphur ointment, sun cholera tablets, spirit of nitrous ether, ointment of zinc oxide.

The names of preparations listed by other countries are indexed and described. The volume contains an Index which makes it possible to look up preparations under various foreign titles. To us it seems a timely compilation and should be useful as indicated in the abstract of the Preface.

DONATION OF A VOLUME TO AMERICAN INSTITUTE OF PHARMACY BY L. C. PARSONS, BOSTON, MASS.

The first part of the treatise on minerals, in which is explained the separation of gold from rocks, sand, clay and other components of the earth by the use of spirits of salt (hydrochloric acid) which is the only method by which such separation may be effected, and in which is also made known a Panacea or Universal Medicine, antimonial, with explanation as to its use by Hans Rudolph Glauber; translated into French by M. Du Teil, Paris, Thomas Lolly Iure Bookstore, Rue St. Jacques, at the corner of the Rue de Parcheminerie at the Arms of Holland, A. D., 1659, with the Privilege of the King.

PREFACE TO THE READER IN ABSTRACT.

The author explains that there are many people who, not knowing his experience, his travels, etc., have accused him of inability to put into print what he has maintained in regard to his scientific ideas. He accuses his enemies of having spread a rumor that either he knows nothing new or that what he knows he has obtained from other people. He states that if he were to follow the inclination of his nature he would be too proud to reply to them and would keep silent, but that his better sense and his regard for his fellow men demand that he give to the world the results of his studies. Thereafter he explains that many people will not understand him because they are ignorant and that many other people will not want to understand him because they are envious, that for the glory of God and for his love for his fellow man he is determined to give to the world what he knows, not in an artful way to please literary dilettants, but with a probity of words so that his great secrets may be understood by those sincerely desirous to know them.

The author gives a brief description of his work, "Treatise on Minerals," which he divides into three parts: Part I, the separation of gold from other metals in rocks, sand, etc. Part II, the generation and death of minerals and metals. Part III, the possibility of the transmutation of metals which the author states is his great desire to accomplish for the glory and benefit of the human race.

The Merck Manual of Therapeutics and Materia Medica. A source of ready reference for the physician. Sixth Edition, Fabrikoid. 1379 pages. Price $2. Compiled and published by Merck & Co., Inc., Rahway, N. J.

"From an original two hundred and fifty pages in 1899, the Merck Manual has grown to one thousand, three hundred and seventy-nine pages. The new edition has been entirely rewritten, yet maintains the characteristics of preceding editions which have made it a standard reference publication for physicians, students, pharmacists and nurses.

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"This feature of combining savoir faire with medication and accessory regimen represents a departure from stereotyped therapeutics.

"In the therapeutic portion of the more than thirteen hundred pages, two hundred and fifty-seven pathological conditions are presented alphabetically, with reference to etiology, diagnosis and therapy. Over two thousand prescription formulas chiefly covering official constituents with metric system equivalents, are provided. These are arranged in numercial sequence with reference to the use of each in the therapy."